Logistics Management Institute

Recommendations for Improving Coast Guard Electronics Equipment System and Associated Business Practices

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Executive Summary

The Electronic Equipment Information System (EEIS) is the automated system that the Coast Guard uses to maintain property records of electronic equipment and schedule the calibration of electronic test equipment. The data in EEIS are used to compute allowances of spare parts, plan maintenance programs, and budget for equipment replacement. The quality of those data directly affects the quality of the Coast Guard's logistic support for electronic equipment. Based upon interviews at more than 30 Coast Guard activities, we have identified a number of areas for improvement in EEIS. We have also identified broader logistics issues that call for a reexamination of several Coast Guard policies and business practices. This report describes those areas for improvement in EEIS and logistics issues, and presents our ideas for resolving them.

Many EEIS users expressed concern over its inefficient interface, limited functionality, and inadequate technical support. The system calls for electronic equipment to be assigned standard nomenclature, but the methods used to assign the nomenclature are inconsistent and cumbersome. Most of the users surveyed stated that it takes too long to verify equipment model and serial numbers, so their records are usually inaccurate. In addition, EEIS does not provide continuous life-cycle visibility of electronic equipment or connectivity between users.

To improve EEIS, we recommend that the Coast Guard make the following modifications:

- Incorporate into EEIS a graphical user interface, a powerful query capability, and an ability to customize report formats easily.
- Expand the functionality of EEIS to support configuration management, scheduling of planned maintenance, automated generation of logistics documents, automated technical research, and equipment budgeting.
- Connect EEIS users to a central "data warehouse" that has the capability to maintain the Coast Guard's database of electronic equipment and to rapidly disseminate technical information.
- Establish policy, and procedures to ensure that each type of electronic equipment is assigned a standards nomenclature before it is installed.

- Apply bar codes to electronic equipment to speed the inventory process and employ hand-held scanners to read the bar codes efficiently.

- Expand the scope of reporting in EEIS to include all Coast Guard activities that have custody of electronic equipment.

- Provide EEIS users with a training program, a computer-based tutorial, and extensive context-sensitive help built into the software.

Since EEIS is being incorporated into the Accountable Inventory Management and the Configuration Management Plus systems, we recommend that the Electronic Systems Division (G-TES) in Coast Guard Headquarters advocate implementing our recommendations in those systems as they are developed.

We recommend that G-TES utilize a phased-development approach to improve EEIS. In the short term the Coast Guard should incorporate all Electronics Inventory Records (EIR) into a central site and provide remote access to that facility, make numerous interface improvements, and electronically disseminate the master nomenclature file. Mid-term actions should include bar-code tracking of electronic equipment, automated scheduling of planned maintenance, and establishing comprehensive life-cycle visibility of electronic equipment. Our long-term recommendations include an expansion of the EEIS data structure, use of a modern graphical user interface and more powerful query tools, and development of a range of new technical reference files and an automated technical research capability. This will require the more powerful technology to be fielded with the Coast Guard Standard Workstation III and the Windows NT operating system.

Our discussions with field activity personnel also uncovered several logistics policy issues. Too many organizations select and buy electronic equipment, which makes both supply support and maintenance more difficult and expensive. Effective controls are not imposed on how much spare equipment EEIS user can accumulate which increases the Coast Guard's investment in spare electronic equipment by holding inoperable items until replacement items are received. Users also report they cannot perform all of the work required under the planned maintenance system. They do not maintain accurate property records. They also indicate that their electronic repair parts allowance lists are inadequate for their requirements. Finally, the decentralized program for test equipment calibration in the Atlantic Area is not as efficient or effective as the Pacific Area's centrally managed program.

We recommend that G-TES take the following actions to resolve these issues:

- Establish policies and procedures that ensure hardware requirements are satisfied through central procurement of equipment selected as Service-wide standards.

- Develop and implement standard procedures for computing allowances for spare equipment in a manner that meets operational readiness requirements at minimum cost.

- Undertake a complete review of the Electronic Repair Parts Allowance List (ERPAL) process, particularly the merits of using demand data as an alternative to, or in combination with, allowance parts lists.

- Issue policy that requires immediate return of failed repairable parts and equipment when replacement items are ordered.

- Institute a program of central contracting and funding for the calibration of electronic test equipment.

- Investigate why many units cannot perform all of their planned maintenance. If the associated workload is too great, provide units with guidance on which maintenance actions can be deferred and which are critical.

- Provide for regular oversight of the EEIS reporting process, including the use of thorough on-site inspections.

We believe that the Coast Guard has the resources and capabilities to implement our recommendations. The proposed improvements in EEIS would increase both the effectiveness of the system and user satisfaction, while those aimed at the broader policy issues would improve the efficiency of the logistics system and strengthen the support provided to operational units.

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CHAPTER 1

Introduction

PURPOSE

This report presents the results of a survey of the users of the U.S. Coast Guard's Electronic Equipment Information System (EEIS) and an analysis of their property accounting requirements. The survey had three objectives:

- Identify the problems that users have with EEIS, particularly the system limitations that affect the support of electronic equipment
- Determine the EEIS changes and enhancements required by the organizations that maintain electronic equipment and the organizations that support the end users
- Identify the logistics business practices in support of electronics equipment that warrant reexamination.

We also describe user problems with EEIS, identify needed changes and enhancements, and discuss logistics business practices that the Coast Guard should review. The EEIS changes and enhancements we describe do not constitute a system design but rather should serve as a reference for system designers and developers to use in reengineering the current EEIS or consolidating it within new information systems such as the configuration management plus (CMplus) system.

BACKGROUND

Organization and Policy

Overall responsibility for property management and accounting in the Coast Guard is assigned to the Director of Finance and Procurement and further delegated to the Financial Management Division (G-CFM). That division publishes the *Property Management Manual*, COMDTINST M4500.5, which defines personal property as all tangible property except real property, i.e., land and records of the federal government. COMDTINST M4500.5 also describes 10 classes of personal property, one of which is electronic equipment. Within the guidelines provided by G-CFM, the responsibility to manage and account for electronic

equipment is assigned to the Electronic Systems Division (G-TES) in the Office of Command, Control and Communications (G-T). *The Coast Guard Electronics Manual,* COMDTINST 10550.25, includes specific guidance on property accounting for electronic equipment.

Electronic Equipment Information System

The Coast Guard fielded EEIS in 1988 primarily to maintain an accurate inventory of its electronic equipment (except for avionics) and to provide a tool for scheduling the calibration of electronic test equipment. The system is supported by the Electronics Engineering Center (EECEN). To avoid requiring an excessive effort for data collection, EEIS does not include maintenance documentation, interfaces with supply systems, parent-child links for configuration management, preventative maintenance planning, and numerous other logistics functions. Those exclusions were partly motivated by the Coast Guard's earlier experience with the Electronics Installation Change and Maintenance (EICAM) System, first used in the mid-1960s. EICAM required users to document their inventory of electronic equipment and equipment maintenance, including parts usage by item and circuit symbol number. The system was paper intensive, and the electronics community found it extremely time consuming to use. EEIS replaced EICAM to satisfy property accounting requirements and to reduce the administrative workload of electronics maintenance personnel.

The Coast Guard is reviewing EEIS for several reasons. The organizations that maintain electronic equipment and provide logistics support are concerned about the difficulty in using EEIS and its limited functionality. Also, the Inspector General of the Department of Transportation cited EEIS as needing "to be updated and corrected" in a December 1993 *Report to the Secretary.* That report cited EEIS as a "material weakness" in the management of electronic test equipment. The version of EEIS being used today is the same as that cited by the Inspector General. Finally, the Coast Guard is in the midst of a comprehensive upgrade of hardware and software used for configuration management and logistics support. Those efforts include consolidating property management information systems, providing for new capabilities, and integrating functionality with configuration control, maintenance, and supply systems. These new systems must be developed or enhanced with full consideration given to the requirements of the EEIS user community.

Electronic Equipment Information System Users

All Coast Guard organizations that maintain electronic equipment must use EEIS, including vessels, group electronic shops, communication stations, Loran stations, and other units designated by G-TES at Coast Guard headquarters or by the Maintenance and Logistics Command (MLC) Atlantic or Pacific. The record of electronic equipment documented in EEIS forms the Electronic Installation

Record (EIR), the official property record for electronic equipment. EIRs are aggregated by G-TES-3 at Coast Guard headquarters and by the Supply Center Baltimore (SCB) for program management, calculation of repair parts allowances, and logistics support planning. Each MLC uses its units' EIRs to provide them with the necessary electronic test equipment and to plan maintenance and supply support.

Organization of Report

The remainder of this report consists of the following chapters and appendices:

- Chapter 2 – Study Approach. The activities visited during field research and the nature of the analysis undertaken.
- Chapter 3 – Overview of EEIS. A description of EEIS functionality and how EEIS is used within the Coast Guard.
- Chapter 4 – Limitations of EEIS. User concerns about EEIS expressed during the field visits and other EEIS limitations noted during the study.
- Chapter 5 – Requirements for an Enhanced EEIS. A description of the data and functionality required in an improved and expanded information system to support managers of electronics equipment.
- Chapter 6 – Logistics Issues and Business Rules. Logistics issues that are not directly related to the design of EEIS but affect managers of electronics equipment.
- Chapter 7 – Recommendations. Our recommended courses of action to improve EEIS and to resolve the logistics issues addressed in Chapter 5.
- Appendix A – EEIS Requirements Tables.
- Appendix B – Case Study: Success with the Electronic Equipment Information System.
- Appendix C – Glossary.

CHAPTER 2

Study Approach

PROCESS

The research presented in this report focuses on the problems, concerns, and recommendations of EEIS users. We conducted an extensive series of interviews to clarify the issues at each level within the user community, which ranges from independent duty electronics technicians to Coast Guard headquarters. We primarily interviewed personnel who use EEIS or maintain information from it; we also interviewed supervisors of those personnel. Additionally, to better understand the environment of the EEIS user, we reviewed the policy guidance provided by Coast Guard headquarters on the management of electronic equipment and property accounting and the *EEIS Users Manual* provided by EECEN.

The purpose of the interviews was to solicit user comments on EEIS and their desires for improvements. When a problem with EEIS surfaced, we asked users to describe the features of an information system they believed would resolve or mitigate the problem. After discussing those problems, we broadened our inquiries beyond property accounting and management of electronic test equipment. We asked users to suggest, without regard to the functional boundaries of EEIS, attributes of an information system that could help them do their jobs better. Finally, we asked users to discuss any logistics issues associated with the support of electronics equipment that concerned them.

When users reported success in maintaining highly accurate inventories of electronic equipment with EEIS, we asked them to describe their management practices and any adjustments they had made to "standard" EEIS methodologies.

At the conclusion of these interviews, we organized the results into problem areas and categories of required functionality for an improved system. Further, we analyzed the comments on related business rules and consolidated them into brief descriptions of the issues.

FIELD VISITS

We interviewed personnel from the following activities during this study:

- Coast Guard Headquarters [G-TES, G-ELM (Logistics Management Division), and G-CFM]

- MLC Atlantic (TES) and MLC Pacific (TES)
- Supply Center Baltimore
- Groups:
- Baltimore, New York, Fort Macon, Cape May, Hampton Roads, Miami Beach, and Honolulu
- Cutters: *USCGC Munro* (WHEC 724); *USCGC Jarvis* (WHEC 725), *USCGC Gallatin* (WHEC 721); *USCGC Rush* (WHEC 723), *USCGC Hornbeam* (WLB 394); *USCGC Mallow* (WLB 396), *USCGC Sassafras* (WLB 401)
- Electronic Maintenance Detachments: New York, Miami, and Portsmouth,Va.
- Electronic Support Units: Alameda and Honolulu
- Telecommunications and Information Systems Command
- Electronic Engineering Center
- COMDAC Support Facility
- Aviation Repair and Supply Center
- Air Station Elizabeth City
- Training Center, Petaluma
- Communication Area Master Stations: Atlantic and Pacific
- Communication Stations: Miami and Honolulu.

CHAPTER 3

Overview of Electronic Equipment Information System

PURPOSE

EEIS was developed as an automated management system to maintain EIRs, the accountable property record for electronic equipment for all Coast Guard activities. It fulfills a legal requirement of property accounting, plays an important role in the management and logistic support of electronic equipment, and serves as a scheduling tool for the calibration of electronic test equipment. EIRs facilitate calculating repair parts allowances, determining test equipment requirements, and planning for maintenance support.

USERS

Users of EEIS range from activities that account only for the electronic equipment they use and maintain to organizations with oversight responsibility for the entire Coast Guard electronics program. To support the diverse needs of the user community, four versions of EEIS exist.

Group Level

Most Coast Guard organizations that maintain electronic equipment use the "Group-level" version of EEIS. Those organizations include Group electronic shops, vessels at least 180-feet long, communications stations, loran stations, various headquarters units, and other units specified by the MLCs.

If a unit is responsible for maintaining electronic equipment but lacks the necessary data-processing equipment to run EEIS, another activity is designated to maintain its EIR. An example of such designation is Group Cape May maintaining the EIR of the adjacent training center.

Maintenance and Logistics Command Level

The MLCs, Electronic Maintenance Detachments (EMDs), and Electronic Support Units (ESUs) use an MLC-level version of EEIS. The MLCs use EEIS to

prepare consolidated EIR files for Headquarters, Electronic Systems Division (G-TES-3) and for SCB. The EMDs and ESUs use it to account for equipment in their custody. ESUs also use it to consolidate the EIRs of supported units.

Supply Center Baltimore

SCB uses a version of EEIS software that has the capability to help produce an electronic repair parts allowance list (ERPAL) for each EEIS user that maintains electronic equipment. SCB also maintains a consolidated EIR for all EEIS reporting units.

Headquarters

G-TES-3 runs a unique version of EEIS that processes the consolidated EIRs from the MLCs and headquarters units and updates the unified EIR for all EEIS reporting units. G-TES-3 also uses this version to maintain the master file of standard nomenclatures for Coast Guard electronic equipment.

Property Accounting with EEIS

All units running EEIS are responsible for maintaining the "master" EIR of their electronic equipment. EEIS records the basic information needed for property accounting, e.g., noun name, serial number, current cost, and location. It also captures various information needed for logistics support, including a standard nomenclature, an operating facility account code (OPFAC) of the unit responsible for servicing the equipment, an electronic accounting machine (EAM) code used in processing ERPALs, and a calibration frequency for test equipment. The *EEIS Users Manual*, which EECEN maintains, provides a complete description of the data that EEIS collects.

When a unit maintains electronic equipment that is in the custody of another unit, EEIS is used to prepare the accountable EIR for the custodian to verify and sign, thereby acknowledging responsibility for the accuracy of the report. In practice, the custodians normally rely on the supporting technicians to present an accurate inventory. In extreme cases, custodians do not acknowledge a responsibility to sign their EIR; they consider it the responsibility of the supporting electronics shop.

Each quarter, Group-level EEIS users forward an updated EIR file (colloquially, "offload" the file) to their respective MLC or to Headquarters (G-TES-3) (for headquarters units). District units in the Pacific Area forward EIRs through their supporting ESU, where they are consolidated and sent to MLC PAC. Semiannually, MLCs provide a consolidated EIR file to the EEIS manager at Headquarters (G-TES-3) and to SCB.

The Coast Guard Electronics Manual, COMDTINST M10550.25, Chapter 6, specifies the equipment that should be recorded in EEIS. It also specifically excludes some items such as standard workstation equipment and morale and recreation equipment. If electronic test equipment is considered highly pilferable, it is to be recorded regardless of value. Otherwise, electronic test equipment is recorded only if it is valued at more than $300.00.

STANDARD NOMENCLATURES

A fundamental difference between EEIS and the Unit Financial System, the system used to account for general-purpose property, is that EEIS uses standard nomenclatures. The EIR forms the basis for computing repair parts allowances, determining test equipment requirements, and planning other logistics support. EEIS must accurately capture the population statistics for different equipment, and to do so requires that the equipment be consistently described with a common naming convention. When a unit records an item in EEIS that does not have a standard nomenclature, it enters "None" in the nomenclature field, and requests a nomenclature from G-TES-3.

The EEIS manager at G-TES-3 reviews all requests for nomenclature and makes the appropriate assignments. Those requests can come from any EEIS user or from an acquisition manager planning to field new equipment. If DoD has already assigned the equipment a Joint Electronics Type Designation System (JETDS) nomenclature, that nomenclature is normally used in EEIS. Otherwise, the current practice is to combine the manufacturer's model number with the Commercial and Government Entity (CAGE) code of the manufacturer to form the standard nomenclature. Previously, standard nomenclatures were often constructed by using the manufacturer's designating symbol (MDS) to identify the manufacturer. CAGE codes are preferred over MDS codes because DoD no longer maintains the MDS coding system and newer manufacturers have not been assigned MDS codes.

When G-TES-3 releases an updated nomenclature file, it is sent to EECEN, copied to diskettes, and mailed to more than 280 registered users of EEIS. The diskettes contain both a transaction file with all changes to the nomenclature file and a complete version of the new nomenclature file. Except for new EEIS users, the transaction file is normally used to update an existing nomenclature file.

When a nomenclature request results in a new entry in the master file, the user who requested the new nomenclature receives the updated file and must manually edit the EIR to update the "none" entry with the new nomenclature.

OVERSIGHT OF EEIS

The Electronic Maintenance Detachments and Electronic Support Units as well as the Maintenance and Logistics Commands monitor the application of EEIS at electronics maintenance facilities.

EMD/ESU Technical Assessments

EMDs and ESUs visit units on a regular basis to provide technical assistance and training and to validate compliance with regulations. During these visits they normally verify that the units have the current version of the master nomenclature file and spot check the accuracy of the EIR against the electronic equipment in the unit's custody. They also normally ensure that the custodians have signed their EIRs as required.

Maintenance and Logistics Command Oversight

While both MLCs play a role in monitoring the use of EEIS in the field, the degree of oversight differs.

MAINTENANCE AND LOGISTICS COMMAND LANT

MLC LANT processes the EIR offloads through a unique data system that it created. That data system compares the accuracy of unit EIRs with the MLC LANT database of electronic equipment, which reflects previous unit EIRs and other data provided by the EEIS manager at MLC LANT, such as new test equipment issued by MLC. MLC LANT generates periodic "feedback reports" that identify apparent discrepancies and the units that need to address those discrepancies. For instance, if the comparison of the current EIR with the previous one shows an item is missing, the feedback report lists the item as "unaccounted for" unless the unit has provided the document number of the transfer or disposal transaction. The MLC LANT data system also tracks equipment transfers between units. For example, if Unit A reports transferring an item to Unit B and Unit B does not show that item on its EIR, then Unit B will be asked to address the discrepancy through the feedback report.

The MLC LANT data system also provides EIR data to SCB when a unit is scheduled for an ERPAL update. However, EEIS (not the MLC LANT data system) is used to consolidate EIRs and provide them semiannually to headquarters (G-TES-3) and SCB.

MLC PAC

In MLC PAC, oversight of EEIS is neither as structured nor as comprehensive as that in MLC LANT. When MLC PAC loads a unit EIR, EEIS automatically produces a "load report" that identifies changes from the previous EIR. If changes appear questionable, MLC PAC contacts the unit to clarify the situation, which often results in corrections to the EIR. No custom software is being used at MLC PAC for this review, and managers rely extensively on their knowledge of the equipment configuration of their units. No regular system of feedback reports exists. To support the ERPAL process, MLC PAC runs EEIS on a separate computer so that it can correct any questionable entries or missing records in the unit EIR without altering the property records that it provides semiannually to Headquarters and SCB.

Electronic Test Equipment Calibration Schedule

EEIS records include a field to identify electronic test equipment and its frequency of calibration. The system limits the user choices for calibration frequency to annually, semiannually, quarterly, monthly, or noncalibrated. Based on the entries in the "frequency" field and entries in the "date last calibrated" field, the system produces a "Calibration Due Report." When a required calibration frequency does not match one of the allowed frequencies, many users enter a fictitious "last calibrated" date, usually in the future, so that the equipment is correctly scheduled on subsequent Calibration Due Reports.

Many users reported that the Calibration Due Report is the most valuable feature of EEIS, even given the limitations on the calibration frequencies that EEIS will accept. Other users have elected not to use EEIS as a calibration scheduling tool because of the limited choices for calibration frequency.

Application of EEIS Reports

Operational Unit

Except for the Calibration Due Reports, the operational units cite few uses for the reports available from EEIS. They view property accounting as an element of administrative overhead that must be performed to satisfy the requirements of higher authority. A few units reported using EIRs as part of a familiarization process for a new technician or electronics maintenance officer (EMO). One unit visited during this study uses its EIR as a checklist to verify whether it had all the technical publications needed to maintain its equipment.

Maintenance and Logistics Commands

MLCs rely on EEIS to track the population of electronic equipment they support. That information is used to plan for equipment replacement and upgrades, plan their maintenance program, and determine electronic test equipment requirements. They also use EEIS to provide SCB with specially edited EIR files that exclude spares, excesses, and test equipment. These files are provided every 18 to 24 months, when the unit is scheduled for an ERPAL update.

Supply Center Baltimore

SCB uses the EIR data to calculate the repair part allowances provided in the ERPALs. SCB applies its knowledge of platform configuration and other available data and makes necessary adjustments to EIRs before running the ERPAL calculations. Occasionally, SCB identifies nonstandard equipment that should be reclassified as centrally supported when the equipment is held by a sufficient number of units.

SCB also uses the consolidated EIR file of all electronic equipment, which is updated twice a year and includes operation equipment, spares, excesses, and electronic test equipment to plan its overall program of repair parts support.

Headquarters

G-TES-3 uses the headquarters version of EEIS to maintain the master file of standard nomenclature. It also uses EIR data to develop budgets for equipment acquisition and replacement, plan maintenance programs, allocate resources for equipment maintenance, and respond to questions from program sponsors about the installed population of electronic equipment under its cognizance. Since EEIS is not designed to directly answer many questions that G-TES-3 personnel encounter, they are often forced to review comprehensive EIR listings to extract the necessary information.

In Chapter 4, we describe some of the limitations of EEIS that users have experienced.

CHAPTER 4

Limitations of Electronic Equipment Information System

Interviews with EEIS users revealed that the system has numerous shortcomings, from simple data structure or design problems to an inability to support a broad range of management requirements. In this chapter, we first describe the problems directly related to property accounting and the scheduling of test equipment calibration; then we discuss problems with the EEIS interface, utility functions, and system security. We conclude with the problems related to system functionality, training, and oversight.

PROPERTY ACCOUNTING

The system limitations described in this section pertain to its most fundamental purpose, accounting for electronic equipment at Coast Guard activities.

Maintaining Accurate Equipment Inventories

Many users at units with a high number of equipment repairs and transfers, (e.g., a Group), report that maintaining an accurate EIR is too time consuming. They cite the following reasons, most of which go beyond the design of EEIS:

- Inefficient user interface
- Amount of time required to verify equipment identity and serial numbers, particularly when it must be pulled from racks
- Equipment changes made by personnel who are not involved with EEIS and not aware of the requirement to keep the system current
- Custodians failures to monitor equipment changes and relying exclusively on the EEIS manager to maintain the EIR
- Lack of a tracking system for dealing with loaned equipment
- A widespread attitude that property accounting is a low priority.

Most users expressed little confidence in the accuracy of their EIR and the EIRs that are provided to them. Both MLCs and SCB must apply considerable effort to correct EIRs before ERPAL calculations. This situation appears to stem from the design of the EEIS system and the lack of motivation of many users to keep their property records up to date.

Standard Nomenclatures

It is essential that equipment recorded in EEIS be identified with standard nomenclatures. However, serious problems exist with the methods used to maintain and distribute the nomenclature file and to deal with electronic equipment for which standard nomenclatures are not assigned.

Maintenance of Master Nomenclature File

All user requests for standard nomenclature are reviewed and processed by Headquarters (G-TES-3). If tracking the equipment in EEIS is appropriate, G-TES-3 assigns a nomenclature and updates the master nomenclature file. The process used to assign the nomenclature depends on the G-TES-3 EEIS manager's ability to ensure standard conventions of naming. However, the software performs no editing functions and will accept any nomenclature up to 24 characters. The various approaches used over the years by different EEIS managers have confused users because nomenclature is the key field in EEIS and the basis for accessing individual records or conducting inventories. Some nomenclatures have spaces between the model number and the manufacturer's code, some have dashes, and others enclose the manufacturer's code in parentheses. Both MDS and CAGE codes have been used to identify manufacturers, sometimes preceding the model number and other times following it. In addition, some equipment has been assigned more than one "standard" nomenclature. For instance, a particular Sunair high-frequency transceiver is currently recorded as "RT-1494(P)/URC-116(V)" (in JETDES format) and "CDIE-GSB-900DX" (in MDS model number format).

Another fundamental problem in maintaining the master nomenclature file is the timeliness of file updates. Most requests are mailed to Headquarters, where they must be processed by the EEIS manager in G-TES-3 before the master file is updated. Our research indicates that the time between updated master nomenclature files has ranged from three months to one year.

Distribution of Nomenclature File

Distributing the nomenclature file on diskettes through the mail is apparently an unreliable process. Several field units indicated that they sometimes do not receive the latest nomenclature file from EECEN and must obtain a copy from their supporting EMD or ESU.

Update of "None" Entries and Nomenclature Changes

When a unit updates its nomenclature file, EEIS generates a listing of the new nomenclature that has been added to the master file. The user must visually scan this list and compare it to a listing of "None" entries on the EIR to identify the records that need to be edited to include the new nomenclature. This process is error prone. The user may fail to process the report or attempt to do so but overlook an applicable nomenclature. That oversight would leave the record in the unit's EIR as a "None." The EEIS system does not have any capability to detect this type of mistake.

If G-TES-3 changes a nomenclature, the next distribution of nomenclatures reflects the change in the transaction file. When a unit processes that file, EEIS not only updates the unit's nomenclature file, but also its EIR (if the unit has that equipment listed) with the new nomenclature. However, if the unit does not receive the updated diskettes or does not correctly process the transaction file, its EIR will continue to reflect the obsolete nomenclature. When the unit's EIR reaches G-TES-3 following the next offload, the equipment listed with an obsolete nomenclature will not be visible to G-TES-3. The design of EEIS calls for *all* nomenclature files to be updated in a timely manner. However, the problems created by mailing diskettes to users, and the need for the user to process them, often preclude timely updates.

EEIS Data Structure

From the perspective of Coast Guard personnel who maintain electronic equipment, the EEIS data structure seriously limits their performance. The master nomenclature file needs to be expanded to provide additional information that would reduce data entry requirements and facilitate expansion of the functionality of EEIS. If EEIS provided more data on equipment, e.g., national stock number (NSN), allowance parts list (APL) number, information on field changes, and preventative maintenance requirements, then EEIS could address a more complete range of the technicians' needs. Furthermore, the system does not provide adequate space for comments in the EIR records and descriptive fields for equipment recorded with a nomenclature of "None."

From the perspective of headquarters, MLCs, and SCB, the data structure of EEIS imposes serious limitations on its utility. Managers at the headquarters, MLC, and SCB levels often struggle to derive more information from EEIS than it was designed to provide. For instance, an EIR cannot be queried at the unit or Coast Guard-wide levels for equipment under the cognizance of a specific sponsor, e.g., the Office of Navigation. Further, equipment reports cannot be extracted on the basis of equipment age or broad functional areas, such as high frequency (HF) transceiver.

Equipment Transfers

Transfers of equipment, including disposal actions, cause users many problems in maintaining accurate EIRs. These difficulties stem from an ineffective system design and inadequate user training. Users also indicated the following EEIS limitations associated with equipment transfers:

- Lack of connectivity between the EEISs of different units, which allows gaps and inconsistencies when EIRs are consolidated
- Absence of any automatic prompts or system edits to ensure that users provide document numbers for transfers or disposals
- Absence of a comprehensive maintenance transaction history or audit trail
- Lack of a connection between EEIS and the management system that SCB employs to monitor the turn-in of unserviceable reparable items when new items are requisitioned
- Lack of a capability to record simultaneously on one screen the information for an equipment replacement, both old (transfer/removal) and new (install action)
- Lack of a utility for quickly posting equipment transfers among units in a group
- Unavailability of information on EEIS procedures for subunit transfers.

Batch File Orientation

Because of the design of EEIS, many users must routinely work with incomplete or inaccurate files. The nomenclature file is distributed in batch mode and is quickly out of date in the field as changes are made to the master file at Headquarters. Moreover, the EIRs held by the MLCs, SCB, and Headquarters are the result of batch file transfers from custodial units. In an era of electronic data interchange (EDI) and electronic mail (E-mail), this system design is clearly obsolete. Without a systematic integration of the EEIS system through a central data hub, the timeliness and accuracy of information available from EEIS will always be questionable.

Life-Cycle Visibility

A fundamental weakness of EEIS is its inability to provide continuous visibility of electronic equipment over its entire life cycle. When electronic equipment is held by SCB, a Ship's Maintenance Electronics Facility (SMEF), or a

commercial repair contractor, the item does not appear on any EIR. Even if all EIRs are linked into a common database, this interruption in visibility limits the integrity of the system and its potential to provide control of electronic assets. It prevents EEIS from being used to provide total asset visibility of electronic equipment. Furthermore, it limits EEIS's use for tracking alterations to equipment, exposing inefficiencies in transportation and material control systems, and measuring depot-level repair times. Those limitations will become more pressing as the Coast Guard's equipment budgets decrease.

Configuration Management

Parent-Child Relationships

EEIS does not allow major systems to be linked with component subsystems, which results in the following limitations:

- Equipment listings cannot aggregate the subcomponents of a parent system under the parent listing. Thus, equipment inventories are more difficult to perform and EEIS reports are not very useful for familiarizing new maintenance personnel with a suite of electronic equipment.

- EEIS cannot automatically interface with the Ship Configuration and Logistics Support Information System (SCLSIS) that SCB uses to provide configuration data to the Navy. The Coast Guard uses SCLSIS to obtain funding from the Navy to maintain Navy equipment used by the Coast Guard.

- EEIS cannot compare the configuration of an installed system with the standard configuration, nor can it automatically determine the *version* of a system based on its configuration. These limitations affect the system's value for ERPAL calculations and maintenance planning.

- EEIS cannot automatically identify deviations from normal system configurations, information that could be helpful to maintenance managers and SCB.

Alterations

EEIS cannot track alterations (field changes, modifications, and engineering change proposals) to individual equipment. That limitation compromises the quality of ERPALs and renders EEIS incapable of supporting the planning and management processes pertaining to equipment alterations. EEIS cannot be an effective configuration management tool without recording equipment alterations.

SCHEDULING CALIBRATION OF TEST EQUIPMENT

The most pressing EEIS limitation with respect to test equipment is the restriction it places on specifying the required frequency of calibration. When the correct frequency does not match one of the four predetermined options (1, 3, 6, or 12 months), EEIS cannot generate accurate calibration schedules unless the user enters a fictitious "date last calibrated."

EEIS users identified several additional weaknesses in EEIS's ability to schedule test equipment for calibration. They include the following:

- Calibration schedules do not list the test equipment in order of the date of the next required calibration.
- Users cannot easily identify electronic test equipment in the custody of the calibration laboratory, either for calibration or repair.
- EEIS does not allow users to record items as electronic test equipment being held as *spare* and therefore excluded from the calibration program.
- EEIS does not have the capability to mark several records and update the "date last calibrated" field simultaneously. This issue arises because test equipment is often sent to, and returned from, calibration laboratories in batches.

USER INTERFACE AND SYSTEM UTILITIES

Users also expressed a number of concerns about the EEIS interface. Those concerns are discussed in the following subsections.

Character-Based Design

EEIS uses the "sliding window" interface typical of software created with the Application Development System (ADS). As users gain more exposure to modern graphical user interfaces with mouse support, typically created for the Windows operating system, they become increasingly disenchanted with the EEIS interface. Users complain that access to records and functions is too slow and requires too many key strokes.

EEIS relies too much on precise character-based input from the user. For instance, when specifying the "date due" for a calibration report, users must type in the month and year of the end of period desired instead of selecting from a list. The month entry is also case sensitive. As an example, "Jan" is acceptable, but "JAN" is not.

EEIS's reliance on the standard nomenclatures to access individual records is a common complaint, primarily because the format for nomenclatures is not standard and the coding systems used to identify manufacturers is not intuitive.

Queries

Although EEIS provides users with the capability to write custom, or ad hoc, queries, most users interviewed do not understand how to formulate those queries. Evidently, this lack of understanding occurs because of confusing instructions in the *EEIS Users Manual* and inadequate training. Users of ad hoc queries at G-TES-3 and MLCs complained that the queries sometimes run for hours and then terminate with no explanation of why they failed. Moreover, the output from queries cannot be displayed with custom "full-screen" (or page) formats within EEIS.

The query options available in EEIS have the following additional limitations that appear to stem from EEIS not having a facility similar to the Structured Query Language (SQL):

- Users cannot access a record by specifying the model number or serial number.
- EEIS has no "wildcard" query capability that allows users to query on the basis of the inclusion of a particular text string in a field.
- EEIS cannot construct queries based on Boolean combinations of data values.
- Ad hoc queries, when successful, run extremely slow.

Editing Records

A common complaint about the editing features of EEIS is the user's inability to stay within the context of a particular unit or subunit when editing records. For instance, a user who needs to edit the "location" field for several records of the same subunit must repeatedly work through a menu structure to identify the subunit for each change. To perform multiple actions of the same type, the user cannot mark records and enter the action once.

Checking Serial Numbers and OPFACs

EEIS does not adequately check data entered by users for any errors, other than for equipment nomenclatures. It cannot record the known format of manufacturers' serial numbers and then use them to detect data entry errors.

Furthermore, when an OPFAC is entered into EEIS to create a unit, the code is not checked against a reference file of valid OPFACs.

Undo Command

The absence of an "undo" feature causes serious frustration for users, particularly when they make a typing error entering a serial number for new equipment or transfer the wrong item.

Context-Sensitive Help

Users would like stronger context-sensitive help features, along with *examples* of all commands and transactions. They would also like to quickly access clear explanations of all data elements used in EEIS. A fast, plain-language interface between manufacturers' names and their codes is also lacking.

Equipment Replacement Screen

A common transaction in EEIS entails recording the replacement of a piece of equipment with a new one. The user interface at present treats these as two completely separate transactions. They should be linked and processed on one screen to minimize key strokes. For example, users should not have to specify OPFAC, subunit, and location if those data for the new record were pulled from the record of the item being replaced.

Utility Features

Users are concerned about the following limitations in EEIS utilities:

- EEIS cannot format its output for laser printers.
- EEIS cannot complete numerous equipment-related forms, e.g., DD Form 1149.
- EEIS cannot specify a default "service OPFAC," to identify the activity that provides maintenance support for equipment.
- System setup does not enforce a consistent order between EIR offloads and EIR purges of records marked for deletion. Although MLC PAC and MLC

LANT have conflicting preferences based on their particular management systems, they both want their units to perform these actions in a consistent sequence.

- EEIS cannot quickly delete a unit from an MLC-wide EIR.

System Security

The security features of EEIS need to be enhanced to resolve the following issues:

- Users cannot be given tailored access in EEIS to allow them only to change records of the units or subunits specified by the system manager.
- EEIS does not maintain a long-term transaction log that records the user, date, and time of all changes to the EIR.
- User access cannot be restricted to only electronic test equipment or only equipment other than test equipment.
- The MLC-level software cannot ensure that EIR offloads from Group-level users include only units for which they are authorized to report.
- The screen used to specify a user's capability with EEIS and the supporting instructions in the *EEIS Users Manual* are difficult to understand.

Limited Functionality

EEIS was designed to meet the requirements of property accounting for electronic equipment and to schedule the calibration of electronic test equipment. The EEIS user community, however, needs an information system that offers more than those features. To maximize the time that technicians have for equipment maintenance, the system must provide more complete support for their administrative requirements. Moreover, the efficiency of the Headquarters, MLCs, and SCB would be strengthened if EEIS could satisfy more of their information requirements. Users have expressed a desire for EEIS to perform the following additional capabilities:

- Record parent-child relationships between equipment
- Record alterations, planned and accomplished
- Schedule and document preventative maintenance
- Prepare common logistics documents

- Integrate resources for technical research
- Support the process of taking inventories with the use of bar codes
- Support equipment budgeting and replacement planning
- Calculate optimal test equipment requirements.

TRAINING

Many EEIS users expressed a need for a training program. At one time, EEIS was included in the curriculum at Electronic Technician (ET) "A" school. However, most users expressed a belief that "A" school is too early to receive EEIS training because ETs are typically not directly involved with EEIS for several more years.

The Coast Guard Electronic Manual, COMDTINST M10550.25, states that EECEN is responsible for providing EEIS training. However, no EEIS training program now exists. (EECEN has produced an introductory video tape on EEIS, but users do not consider it a substitute for a training program.) EMDs and ESUs provide assistance on a case-by-case basis, although they are not always qualified to conduct thorough EEIS training. To illustrate, ETs at several EMDs and ESUs indicated they did not know how to formulate ad hoc queries in EEIS.

Users have also expressed a need for a computer-based tutorial that would teach and test competence with all EEIS functions and transactions. EMOs afloat have expressed a particular desire for computer-based training because their personnel typically have more time available for training when they are underway.

PERFORMANCE OVERSIGHT

When viewing EEIS as a management system and not just an information system, we found a widespread lack of discipline in accounting for electronic equipment. Many units freely admitted that their EIRs were not current. They typically cited insufficient time for keeping the records accurate, but they seem to view careful property accounting as an *optional* activity. Other units have taken this responsibility seriously and made an accurate EIR a priority. (Appendix B discusses how a large unit has succeeded in keeping its EIR current.)

It appears that in addition to giving users a more efficient management tool for maintaining their EIRs, they must also be given more motivation to carry out that responsibility. The oversight provided by the EMD and ESU technical assessment visits is rather cursory. Moreover, many managers do not understand the negative effect that inaccurate EIRs can have on their logistics support. A

training program for EEIS needs to address *why* the Coast Guard needs accurate EIRs, as well as *how* to maintain them.

In this chapter, we detailed many of the shortcomings of EEIS. We build upon those in Chapter 5 by presenting the requirements for an upgraded EEIS.

CHAPTER 5

Requirements for an Enhanced Electronic Equipment Information System

In this chapter, we provide the requirements for an information system to support the managers and maintainers of Coast Guard electronic equipment. These requirements should be considered in the design of a new system, whether it is a separate system or part of a larger information system serving more than the electronics community. Many of the requirements could be satisfied by the current Coast Guard Standard Workstation II and Convergent Technologies Operating System (CTOS). The initiative to upgrade to Standard Workstation III and the Windows NT operating system creates the opportunity to fulfill the remaining requirements.

SYSTEM CONNECTIVITY

All EEIS users should be connected to a central site serving as a "data warehouse" for all EIRs, transaction records, and supporting reference files. The central site should serve as a communications hub through which all EEIS-related transactions would pass. The central site should be responsible for the following activities:

- Integrate all EIRs into a Coast Guard-wide database
- Replace the "offload" system with a system based upon transactions that update the central site within 24 hours of a change in the field
- Provide users with on-line access to EIR data for property accounting, ERPAL calculations, equipment budgeting, and other logistics planning tasks
- Maintain permanent records on electronic equipment, including ownership and alteration history
- Support in-transit tracking of equipment, with automatic generation of follow-up actions when receipt posting is overdue

- Disseminate reference files, including the master nomenclature file, to all EEIS users
- Serve as a communications hub for all equipment-related documents and nomenclature requests
- Provide rapid feedback to users when a transaction is erroneous or questionable
- Disseminate ERPAL updates and amend local records with current allowances
- Maintain a long-term archive of all transactions that change EIRs.

EQUIPMENT RECORDS

EIRs should comprise centrally maintained data, which are provided in the master nomenclature file, and locally maintained data. The structures of both sets of data should be expanded.

Master Nomenclature File

The master nomenclature file should provide all data for property accounting, test equipment management, and configuration management that can be uniquely associated with an equipment nomenclature. That information is listed in Table 5-1. By providing nearly-real-time updates to this file through the central site, data-entry requirements in the field would be reduced and system integrity improved. The data in this file should be maintained primarily by the Headquarters EEIS manager, SMEFs, and maintenance managers for the equipment.

The following data items from Table 5-1 are an extension beyond the current structure of the master nomenclature file:

- *Alias nomenclature.* This data item provides for multiple means of access to EEIS records. It would allow the Coast Guard to standardize nomenclature on the model number CAGE code format but still allow users to query using well-known JETDS nomenclatures.
- *IMP serial number.* The index of maintenance procedures (IMP) number, a reference to the planned maintenance actions for equipment in the Planned Maintenance System (PMS) system.
- *Procurement source.* The commercial source for the item.

Table 5-1.
Master Nomenclature File

Data	Explanation/comment
Nomenclature	Either JETDS or model number/CAGE code
Alias nomenclature	If both model number CAGE code and JETDS codes are well known
Manufacturers CAGE code	Commercial and government entity code
Model number	As assigned by the manufacturer
IMP serial number	Numbers of the Index of Maintenance Procedures for PMS
Noun name	Brief plain language name for equipment
Description	Full text description of equipment
Procurement source	Best source for acquisition
Requisitioning source	Source of supply from which units requisition
Acquisition cost	Standard price
Replacement cost	If established by the program manager
Replacement date	If established by the program manager
Replacement equipment	If established by the program manager
Calibration frequency	Entry indicates item is test equipment; number of months between calibration specified ("00" means calibration is not required; blank means the item is not test equipment)
SCAT code	Special category code (SCAT) reflecting functionality of test equipment
EAM code	For casualty report (CASREP) and ERPAL purposes
APL number	Number of current APL
APL date	Date of current APL
National stock number	For cataloged equipment items only
Owner agency	Agency for which equipment was built, e.g., USCG or USN
Support agency	Source of technical support
Equipment sponsor	Agency or office with primary interest in the equipment
Classified	A flag to indicate if the item has a security classification
Technical manual	Number, title, and source
Hierarchical structure code (HSC)	For configuration management and grouping equipment by broad classes, e.g., "radar"
Alteration types and numbers	Applicable field changes, modifications, or engineering change proposals

- *Requisition source.* The federal government activity from which the item can be requisitioned.

- *Acquisition cost.* The price the Coast Guard would pay for a new identical item.

- *Replacement cost.* The estimated price of a selected replacement item.

- *Replacement date.* The projected obsolescence date.

- *Replacement equipment.* The selected replacement item.

- *SCAT code.* The "special category" code that indicates the functionality of test equipment.

- *Equipment sponsor.* The office with primary technical interest in the equipment.

- *Classified.* The identity of equipment items that are classified.

- *Hierarchical structure code.* The identity of the major system and indenture and the classification of the item for configuration management, interface with SCLSIS at SCB, and support for equipment queries that focus on broad functional descriptions.

- *Alteration types and numbers.* Planned or accomplished alterations for the equipment. This information acts as a link to an alteration reference file and to local EIR files.

Equipment Installation Record — Locally Maintained Data

The EIR for a unit documents the electronic equipment in its custody and consists of unit-maintained data and associated information drawn from the master nomenclature file. EEIS should provide for the set of locally-entered data that are listed in Table 5-2.

The following elements from Table 5-2 represent an expansion of the current EEIS design:

- *Bar code number.* A notation that provides a quick and reliable means of identifying equipment.

- *Primary location.* A location recorded in a local table and drawn from a pick list when entering a new equipment record. It ensures a consistent set of primary locations within an OPFAC or subunit.

Table 5-2.
Equipment Installation Record — Locally Maintained Data

Data	Description/comment
Nomenclature	Either JETDS or model number CAGE code
Serial number	As shown on the name plate
Bar code number	Self-explanatory
OPFAC	Identifies unit that owns the equipment
Subunit	Identifies a component of the owning unit
Primary location	Standardized location name
Secondary location	Amplified location description
Installation date	Initial installation date or, for test equipment, receipt date
Acquisition date	Date Coast Guard initially acquired the equipment
Parent	Record number(s) of parent equipment
Child	Record number(s) of child(ren)
Acquisition price	Provided by organization initially acquiring the equipment
Acquisition source	Provided by organization initially acquiring the equipment
Date last inventoried	Most recent verification of item and serial number
Nomenclature request number	Applicable to items recorded with outstanding nomenclature request
Service OPFAC	Organization that maintains the equipment
Calibration frequency (local)	Initialized from the master nomenclature file; may be edited by the local user
Last calibration date	Applicable only to test equipment
Calibration due	No direct user input; automatically updated when either of the two previous fields change
Calibration cost	Contractual cost to calibrate
User defined field	For local classification of equipment in special projects
Comments	Fixed-length field; can be included in standard reports
Remarks	Flexible-length field
Alteration data (eight sets):	
Alteration type	Field change, engineering change proposal, modification, etc.
Alteration number	Self-explanatory
Alteration date	Date alteration completed

- *Secondary location.* Free-form text used to amplify on the primary location data. For example, the user could select "CIC" as a primary location and "equipment rack, starboard side aft" as the secondary location.

- *Parent.* The record number of the parent equipment record.

- *Child.* The record number of all equipment related as a subsystem of the item.

- *Nomenclature request number.* Used if the nomenclature recorded was not in the master nomenclature file but provided by the user. This number would be part of the nomenclature request submitted to Headquarters and used to update the EIR when the nomenclature request is processed.

- *User defined field.* A means to record local project codes or other management data of a local nature.

- *Remarks.* A flexible-length field available for more extensive amplifying information than will fit in the "comments" field.

- *Alteration data.* Provides room to record up to eight equipment alterations, which is the capacity of the SCLSIS system, with which EEIS should be compatible.

- *Alteration type.* The nature of the change as, for example, field change or engineering change proposal.

- *Alteration number.* The specific alteration.

- *Alteration date.* When the alteration was completed.

TECHNICAL REFERENCE FILES

EEIS needs additional reference files to meet the needs of the user community. In some cases, maintaining these files at a central site and distributing them electronically would eliminate the need for the current hard-copy distribution of this information. In others, the files would provide valuable information not available to most EEIS users.

Organization File

For EEIS purposes, the organization file should reflect the structure of the Coast Guard in terms of lines of authority between organizations that use or maintain electronic equipment. It should include the links in the chain of command as well as classifications of units similar to those reflected in the standard

distribution list. For example, the user should be able to extract the OPFACs of all Loran stations or all 378' cutters quickly and use that information to generate equipment reports. Queries could be further refined to a Coast Guard Area, District, or Group. When combined with a Coast Guard-wide EIR, the organization file would facilitate a wide range of equipment population reports. The file should include mailing addresses, E-mail addresses, and telephone numbers of the EMOs and EEIS managers.

Managers in various disciplines, including naval engineering, communications, finance, personnel, and administration, have recurring requirements for this information. Therefore, the utility of this file to the Coast Guard will be maximized if they are involved in its design. This file could ultimately replace the standard distribution list and other directories that are currently maintained.

Manufacturers' Reference File

This file should provide the manufacturers' names, addresses, telephone numbers, CAGE codes, and serial number formats. It should also contain the contract numbers for maintenance support, listing by contract the equipment covered, their effective dates, and other information pertinent to using the contracts. One way to make that information available to the field is to design EEIS to use the compact disc data provided with the Federal Logistics (FEDLOG) System augmented with data from the central site that are not in FEDLOG, such as Coast Guard maintenance contracts.

System Configuration File

Users of EEIS should have access to a reference file that provides the standard configuration of all electronic systems in the Coast Guard that have parent-child equipment relationships. That file should highlight the differences among all versions of the systems. It could be used to help ETs determine the version numbers of their systems and enable EEIS to automatically analyze system configuration and identify when the installed configuration deviates from the standard. When such a deviation is identified, users should be prompted to either bring their configuration in line with the standard or to enter an explanation of why they consider a configuration change necessary. EEIS would then forward that information to the appropriate maintenance manager and SMEF.

Equipment Alteration File

Approved equipment alterations should be recorded in a reference file that is indexed by standard nomenclature. For each alteration, the file should list the type, number, and cost of making the change. It should also provide a full

description of the alteration and technical instructions for changes be to made in the field.

Allowance Parts List File

Complete copies of all current APLs should be available through the central site. That file should be accessible by either APL number or standard nomenclature.

Technical Manuals

Ideally, EEIS should be able to provide from the central site a technical manual for any equipment in a user's inventory. In some cases, the Coast Guard would need to acquire the rights to disseminate copyrighted documents electronically. Where EEIS cannot provide a manual, it should provide the information needed to confirm that the unit has the most current available copy of the technical manual or obtain missing manuals. EEIS should be able to generate a "library index" of required technical manuals based on an EIR.

Planned Maintenance System Requirements

A complete description of all required PMS requirements should be available from the central site; these requirements should be indexed by the IMP serial number. Both Coast Guard and applicable Navy equipment should be included in the central site file, and data should be available in the format used on maintenance procedure cards (MPCs) and maintenance requirements cards (MRCs). EEIS should also be able to produce an index of all MPCs and MRCs required to support the equipment recorded in an EIR. This reference file should include images and graphics needed to execute the PMS actions.

Hierarchical Structure Code — Description File

The master nomenclature file should include the HSC for each item included in EEIS. The HSC description file should cross-link the HSCs to plain language key words, which would enable EEIS to support queries based on descriptions like "radar" or "HF transceivers." The first five characters of an HSC are the expanded ships work breakdown structure (ESWBS) code. Since the Navy maintains a file that links ESWBS codes to descriptions, the HSC description file could be developed by expanding that file.

PEETE Index

The portable electrical/electronic test equipment (PEETE) index that the Navy maintains should be available through the central site. That index lists all approved Navy and Marine Corps electronic test equipment, their primary application, the quantity required to maintain particular systems, the SCAT codes, the calibration standards, and the CAGE codes of commercial sources. It could be used to cross-reference a SCAT code to a particular model of test equipment. The Coast Guard should work with the Navy to incorporate the Coast Guard-unique test equipment into the PEETE index.

SPETERL File

The ship's portable electrical/electronic test equipment requirements list (SPETERL) is a Navy allowance document that shows the required test equipment for a particular ship. The Coast Guard should develop the management systems for analyzing an EIR efficiently and generate a SPETERL for each cutter. The SPETERL should avoid duplication and cover all requirements for both Navy and Coast Guard test equipment. As EIRs change, the central site should update and disseminate the SPETERLs.

User Interface

A common desire among EEIS users is a more efficient and flexible interface, including an intuitive design, powerful query tools, better report generators, and smooth recovery procedures in the event of user error. Many users have requested that EEIS be redesigned with a graphical user interface similar to modern database systems and compatible with the Microsoft Windows operating system, including mouse support.

Output Media

EEIS should be capable of using all common printers used in the Coast Guard, including laser printers. Users should have the option of printing in either portrait or landscape format, with a variety of font sizes. For any report, the user should be able to specify that the output will go to a screen, a printer, or a file. Automatic routing of the output to more than one medium should be possible.

Pick Lists and "Plain Language" Specification of Manufacturers

EEIS should provide more extensive use of pick lists coupled with "progressive typing" for specifying user selections. Users should be able to access records by specifying the equipment manufacturers in plain language rather than using MDS or CAGE codes. For instance, a user who wants to access the record for an item made by Motorola should have the option to select Motorola from a manufacturer's pick list by *starting* to type the name. After entering "M" the cursor could be positioned at the top of the list of manufactures beginning with "M." Each letter typed would bring the user closer to "Motorola." At any time, the user could switch from typing to the mouse or arrow keys to reposition the cursor on the desired selection.

The pick list/progressive typing style of interface should be provided whenever possible, including user access to records by nomenclature, serial number, or model number.

Queries

Users should be able to a formulate queries to select records based on any field, or combination of fields, in the EIR. An intuitive "query-by-example" style of screen should be available, as well as SQL or a comparable capability. Users should be able to name and save queries, edit them, and reuse them through a pick list of saved queries.

If a user attempts to execute a query that cannot be processed, the system should quickly detect the problem and return a clear diagnostic message to the user explaining the error.

Equipment Inventory Report

Users have requested that the format of their standard equipment inventory reports contain nomenclature, noun name, manufacturer (in plain language), serial number, location, classification (flag indicator), date last inventoried, and comments. The default sort order should be by OPFAC, subunit, or primary location, with page breaks between subunits. User should have the option to use the HSC codes to group equipment by major system. They should also be able to generate a listing of equipment with a "date last inventoried" being earlier than a specified date.

Custom Report Formats

User should be able to design full-page, or full-screen, formats for use in printing or displaying the results of queries. These formats should be easily saved, edited, and reused.

Undo Key

A user who records equipment in EEIS and later discovers that an incorrect nomenclature or serial number was entered should have access to a simple procedure for correcting the mistake without formally removing the original entry and installing the "new" item. Also, a user who accidentally transfers equipment should be able to rapidly reverse the mistake and reset all affected files to their original condition.

A rapid edit feature designed to correct a typing error on a serial number could conceivably be abused as a shortcut to documenting lost or missing equipment. Thus, the Coast Guard should incorporate a parameter, controlled by the Headquarters EEIS manager through the central site, that limits a "quick change" to a certain time period after an item has been entered into EEIS.

Primary Locations

Users should be able to create a list of "primary locations" applicable to any OPFAC or subunit and restrict the entries in the primary location field to the locations on that list. This capability would enable users to use the primary location field to order records in a consistent manner.

Equipment Replacement

When a user installs equipment that replaces a similar piece of equipment, the data for the installation and removal should be collected on the same screen. The common data elements, including nomenclature, OPFAC, subunit, and location, should be specified only once and used for both transactions. The system should prompt the user to indicate the disposition of the removed equipment, e.g., transferred to the "spare" subunit for repair, returned to SCB, or sent to disposal. If appropriate, users should be prompted for a transfer or disposal document number.

Record Context

A user who edits several records within a unit, subunit, primary location, or major system should be able to specify that context and work from a pick list of

those records only. When finished, the user should be able to quickly return to a "global" context of the entire EIR.

Serial Number Validation

The manufacturers' reference file should contain the formats used by the different manufacturers for their equipment serial numbers. An EEIS user enters the equipment serial number when recording a new item and should use these formats to detect data entry errors.

Property Accounting

The property accounting function of EEIS should be strengthened. It should include a carefully designed system for managing nomenclature assignments, bar code identification of equipment, comprehensive life-cycle visibility of electronic equipment, and other features discussed in the following subsections.

Nomenclature

EEIS should require a consistent format for standard nomenclature. Most EEIS users stated that the model number-CAGE code combination is the preferred format except when a JETDS nomenclature is available. If alias nomenclature is recorded in the master nomenclature file, the model number-CAGE code approach could be used for all equipment, and users would still have the option to use JETDS nomenclature when applicable.

A utility routine should be developed for the Headquarters EEIS manager to support the assignment of nomenclature. That routine would process the data provided for manufacturer and model number, form the new nomenclature, and check for existing nomenclature. When a nomenclature request is received electronically, the assignment should occur with minimal human intervention. The manager should simply approve the assignment and the master file would be updated. When a request is received on paper, the manager could enter the model number and then be prompted for the name of the manufacturer, which could be selected using the pick list approach described earlier. In either case, the utility would cross-reference the manufacturer and CAGE code and use a consistent format for delimiting the model number and CAGE code.

EIRs must not contain items with a nomenclature of "none." If a user records a new piece of equipment that cannot be found in the master nomenclature file, the system should prompt for the manufacturer, model number, and other information required on a nomenclature request. The record should be established with a flag automatically set to indicate that a nomenclature request is

pending. The system should also serialize the nomenclature request and send it electronically to Headquarters. When the nomenclature request is processed at Headquarters, the local system should be automatically updated and a status message provided to the user. This update would clear the nomenclature request flag and either establish an EEIS standard nomenclature on the EIR or notify the user that the item should not be recorded in EEIS.

Bar Codes

Bar coding electronic equipment is essential if the Coast Guard is to accelerate equipment inventories and reduce data collection errors. The most feasible approach would be to assign a simple "license plate" number to all items and link them to the EIR records through one-to-one relationships between bar code numbers and nomenclature serial number combinations.

The bar code for new equipment should normally be applied by the organization that first takes possession of the item, including spare equipment received by SCB and test equipment purchased and received by an MLC. The receiving organization should establish a record for the item in the central site, and that record should be used to enter the item on the EIRs of other units that subsequently have custody. The central site should provide blocks of bar code numbers to activities to prevent two activities from assigning the same bar code number to different items.

Programmable hand-held bar code scanners should be used for maximum system flexibility. When portable scanners are used to inventory electronic equipment, they could be initialized (downloaded) from EEIS with current inventory data for the appropriate unit, subunit, or primary location. After the inventory is completed, the scanner should be used to compare the inventory data collected by the operator with the data previously extracted from EEIS. If equipment is missing, the scanner could then prompt the user with the equipment and locations that were on file but not found during the inventory. This second chance to find equipment could save time, particularly when the site is far from the EEIS workstation.

Life-Cycle Visibility

EEIS should be the vehicle for establishing continuous visibility of electronic equipment throughout its life cycle in the Coast Guard. Bar coding makes that type of visibility feasible. As EEIS users, SCB, SMEFs, and MLCs could scan electronic equipment as it is received or shipped and input the destination (OPFAC or CAGE code) when the item is shipped.

If the bar codes are to be applied when the Coast Guard takes possession of the equipment, SCB will need resources to support this process. However, the

efficiency of assigning bar codes centrally would enhance the accuracy of the system and provide better support to operational units.

Equipment Transfers

In addition to the single data entry screen discussed in the section on User Interface, the system for recording the transfer of an equipment item should provide a "reason for transfer." The reasons, selected from a pick list, could include "swapout" of a mandatory turn-in failure of a reparable electronic item that cannot be repaired locally (Code XB), transfer to a Defense Reutilization and Marketing Office (DRMO), transfer of excess equipment to another unit, sent for commercial repair and return, loan, lost (survey), ship alteration, shore station maintenance request (SSMR) (a shore-side configuration change), and "other." In each case, EEIS should prompt the user to provide the appropriate document or authorization number.

EEIS should be designed to quickly record the equipment movement between units and subunits in a Group. Pick lists of the entities in the Group should be maintained by the Group EEIS manager and used to select the destination for a transfer. Movements should include moves to and from the spare subunit.

The system should support an efficient transfer of records on an entire system (parent and children), as well as the equipment from an entire subunit.

Equipment loaned to another unit should be recorded with a specific "due back" date or flagged as an indefinite loan. The system should be able to prepare a report on loaned equipment and equipment held on loan from other activities.

Equipment "due in" should be recorded in a separate table, and automatic follow-ups should be generated if the equipment is not received after a manager-specified number of days. When equipment is received from another EEIS user, automatic confirmation of receipt should be provided electronically to the shipper.

Transaction Reports

The capability to report *changes* to an EIR is important. EEIS users should be able to specify the date range desired, and the system should provide a detailed listing of all changes during that period.

Reports from Multiple EIRs

By using the organizational reference file, EEIS should be able to support queries of EIRs for individual units, as well as units in a particular Group, district, area, or Coast Guard-wide. Furthermore, the unit attribute fields should enable users to restrict the scope of the report to those matching certain criteria, such as communication stations or 270′ cutters.

Service OPFAC

The EEIS manager should be able to record a default service OPFAC for each unit to identify the activity that normally maintains its electronic equipment. Users should be able to edit the service OPFAC in individual records.

The central site should maintain a table of OPFACs for use in validating service OPFACs. That table should be used to detect mistakes in this field, which cause inaccuracies in the ERPAL process. The edit routine could be linked with the organizational reference table to further increase the system's capability to detect errors.

Management of Test Equipment

The most important requirement for users of electronic test equipment is the ability to generate accurate schedules for equipment calibration and to quickly update the calibration records. Tracking the status of test equipment imposes additional requirements.

Calibration Frequency

The normal calibration frequency should be included in the master nomenclature file, which would be entered as a default in the local files when new test equipment is recorded. Users should be able to adjust the frequency on the basis of unit requirements, with their adjusted frequency recorded in the "calibration frequency (local)" field in the EIR. However the Coast Guard may want to allow local users to only shorten the calibration frequency, not to lengthen it. Aside from that restriction, users should be able to specify the number months between calibration from 0 to 99, with zero indicating that the equipment is electronic test equipment but does not require calibration. If the calibration frequency field is blank, EEIS would interpret that to mean the item is not electronic test equipment.

Calibration Schedules

Users should be able to change only the "last calibration date" and calibration frequency (local). The "calibration due" field would be automatically updated each time a change was made to either of these two fields. Standard calibration schedules would be sorted in order of "calibration due" within the scope specified by the user, such as an entire EIR, or select OPFACs or subunits.

Cost Projections

Users should be able to record the cost of calibration in the EIR for individual test equipment items and a default cost that applies when individual values are not available. The calibration schedules should include the cost for the projected calibration requirements by month, quarter, and fiscal year.

Test Equipment Held by a Calibration Laboratory

When test equipment is in the custody of a calibration laboratory, the equipment record should indicate the name of the laboratory, the date it took custody, and when the item is expected to be returned.

Calibration laboratories often return calibrated test equipment in batches. Therefore, users should be able to select several records of equipment marked as in custody of a calibration laboratory and simultaneously update the "last calibration date" field for those records while updating their status.

Out-of-Service Test Equipment

When a unit has custody of a piece of electronic test equipment that is held as a spare, it should have the ability to mark its record as "out-of-service" and suspend the item from the calibration program. When the item is brought into service, the system should compute its "calibration due" and alert the user if the equipment requires calibration.

Application of Test Equipment

If the Coast Guard incorporates the PEETE Index and SPETERL into the EEIS system, as discussed in the Technical Reference Files section, users should be able to extract a report identifying the application of each piece of electronic test equipment held.

CONFIGURATION MANAGEMENT

EEIS will better serve the entire user community if it is capable of tracking equipment configuration at the unit level. That functionality should include recording parent-child relationships, validating system configurations, tracking equipment alterations, and automatically updating SCLSIS at SCB.

Parent-Child Relationships

By SCB maintaining the HSCs in the master nomenclature file and units maintaining the parent-child pointers in the EIR, EEIS would be able to capture parent-child relationships. When an equipment record is established, the system should use the HSCs to determine the equipment with which the item is associated, or list the possible associations. In some cases, the HSCs will resolve to a single probable association. In others, such as multiple installed systems of the same type, they will imply several possible associations. Users would then be asked to confirm the suggested parent-child associations. When an equipment item is changed in a one-for-one replacement, the pointers to the associated parent and children should be automatically updated.

When generating equipment inventory reports, users should have the option of having all children of a parent equipment grouped and slightly indented immediately under the parent record.

The central site database should be designed to allow EEIS to update the SCLSIS at SCB automatically. That automatic updating would facilitate keeping the Navy weapon system file up-to-date on Navy-owned electronic equipment aboard Coast Guard platforms. That information is essential if the Coast Guard is to receive the proper funding for support of Navy-owned electronic systems.

Component Association for Installing/Deinstalling

EEIS should be able to identify the association between components to identify equipment items that are normally removed or installed as sets. For instance, the receiver/transmitter assembly and the antenna in an AN/SPS-69 (small boat radar) are normally handled as a set if the receiver/transmitter assembly fails. However, the two components are recorded separately in EEIS. If users indicate that they just removed or installed the receiver/transmitter assembly, EEIS should prompt to query if the antenna was also removed or installed.

System Configurations

The system configuration file should be used to compare the recorded configuration of all systems with parent-child relationships. If the unit's configuration is not consistent with the reference file, users should be prompted to confirm and explain the rationale for the difference. This information should be provided electronically to the appropriate maintenance manager and SMEF.

Alterations

The alteration data fields should be used to record the type, number, and completion date of all alterations to individual equipment. EEIS should provide for recording up to eight alterations to a particular equipment. These data, together with the equipment alteration reference file, should allow SCB to update the SCLSIS system automatically for Navy equipment and refine the ERPAL calculations.

Record Deletions

The system should not allow a parent record to be deleted if one or more child records remains. Before the parent can be deleted, either the child records must be deleted first or the parent pointers in those records must be cleared or changed. Also, EEIS should challenge any record deletions that would make a system configuration inconsistent with the system configuration reference file.

Ship's Configuration and Change Form

When a system configuration change occurs to a Navy-owned system, Coast Guard units are required to submit a Ship's Configuration and Change Form (OPNAV 4790/CK) to document the change. EEIS should eliminate the need for separate reporting of an equipment change. Once the installation or alteration has been recorded, the only data element that users should have to provide specifically for the OPNAV 4790/CK would be Block 4, "Technician's description of the change." EEIS should provide the data for Block 28, "Record Identification Number," by using the database record number for that equipment. The ship's unit identification code (UIC), i.e. OPFAC, ship's name, and ship's hull number can be drawn from the organization reference file. The other required data elements are available in the EIR.

Equipment Maintenance and Updating of the Electronic Inventory Record

Users have a strong interest in having EEIS automatically generate PMS schedules. Moreover, the technicians' access to equipment while performing PMS affords an opportunity to efficiently validate EIR data. Users expressed almost no desire for an expanded EEIS that would record corrective maintenance on a comprehensive basis. Many users expressed serious concerns about the effort required to record corrective maintenance data.

PMS Scheduling

EEIS should produce a PMS schedule for selected units/subunits, listing the equipment that is due for PMS during the period specified by the user. For each item scheduled, the planning sheet should cite the equipment noun name, maintenance procedure card number, model number, serial number, bar code number, and location. The printed schedule should list *all* preventative maintenance actions established in the PMS system for that equipment and highlight those actions due within the specified period of the report. Those actions would allow technicians to record planned maintenance actions that were not due but they elected to perform.

After completing the work, the technician should annotate the PMS schedule to indicate the planned maintenance actions completed. The annotated schedule would then be used to update EEIS. The format of the EEIS screen used to record the completed PMS actions should match that of the printed PMS schedule.

EIR Validation

Before performing planned maintenance, the technician should verify the equipment's bar code and serial numbers. If either does not match the printed schedule, the technician should record the correct bar code and/or serial numbers.

When the completed PMS actions are posted to EEIS, the "date last inventoried" field should be updated for those items sighted with correct bar code numbers. For mismatches in either serial or bar code numbers, EEIS should suggest the appropriate action required to correct the EIR and resolve the issue of a missing item or incorrect bar code label. This approach should keep most of the equipment inventory up-to-date in the course of recording preventative maintenance actions.

Failure Reporting

A technician may consider a particular corrective maintenance action worthy of higher-level attention, even though it did not require a CASREP. In these situations, EEIS records the user description of the failure, how the failure was discovered, what corrective maintenance actions were performed, and what parts were used. EEIS should provide that information by E-mail to the maintenance manager and SMEF. Such a report should automatically include the EEIS data identifying the equipment.

DOCUMENT PREPARATION

Electronic equipment maintenance personnel are required to complete many time-consuming forms. EEIS should be designed to complete those forms by drawing data from the EIR, the reference files, and the user input in response to on-screen prompts. In addition to printing the forms, users should have the option of sending them by E-mail.

The EEIS user community has expressed a desire that the following documents be produced by an enhanced system:

- DD Form 1149 (equipment transfer document; support transfer of multiple items on one document)
- DD Form 1348 (for making a turn-in to a DRMO)
- CG Form 5269 *Report of Survey*
- SF-120 *Report of Excess Personal Property*
- Nomenclature Requests
- OPNAV 4790/CK *Ship's Configuration Change Form*
- NAVSUP 1250 *Single Line Item Consumption/Management Document*
- CG-5451 *Planned Maintenance System Feedback Report*
- *System Trouble Report* (report to a Ship's Maintenance Electronic Facility (SMEF) of a systemic problem found by a user in a system)[1]
- *System Improvement Report* (request to an SMEF for a change or enhancement to a system)[1]

[1] Currently, SMEFs do not use standard formats for System Trouble Reports and System Improvement Reports. The Coast Guard should consider establishing standard formats for these reports, particularly if EEIS produces them.

- *Software Trouble Report* (automated version of *"ADS Application Bug Report,"* which is included in the *EEIS Users Manual*)
- Mailing labels (with the option to add "to the attention of_____").

TECHNICAL RESEARCH

A significant part of a technician's effort is devoted to using technical manuals, APLs, and the FEDLOG data system to identify material requirements for equipment maintenance. A common scenario involves a technician trouble shooting a problem and identifying the equipment and module needing repair. Next, to identify a required repair part, the technician uses the technical manual to identify the symbol number and crosses it to the part number. The technician then uses the APL to cross the part number to the NSN if that repair part is on the APL. If the NSN cannot be identified by using the APL, the technician uses FEDLOG to find it or the NSN of a substitute item. If the APLs and FEDLOG do not include the part, the description in the technical manual then becomes crucial for identifying a replacement.

Figure 5-1 illustrates the steps involved in researching a spare part requirement. A long-term goal for EEIS should be to integrate the various information sources and to automate much of the technician's research. That integration and automation would greatly boost the technician's productivity.

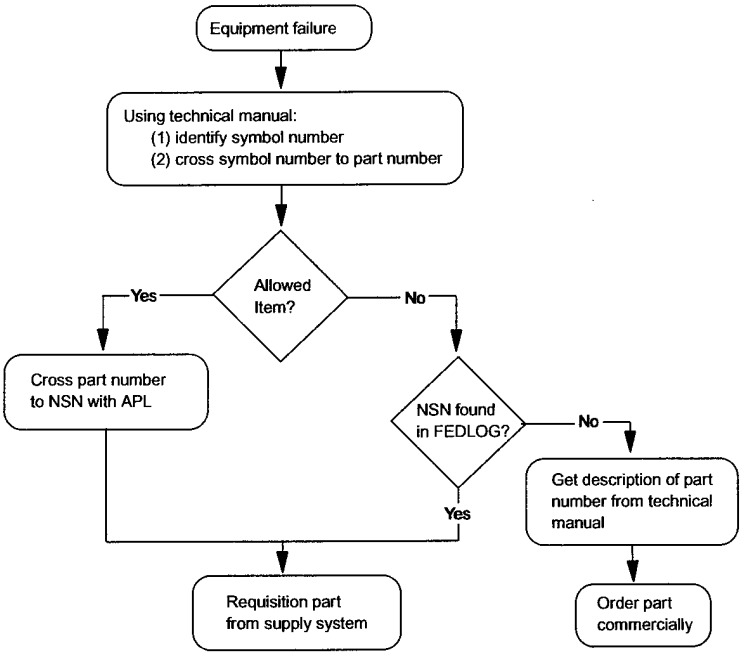

Figure 5-1.
Technical Research for a Repair Part

System Security

EEIS should be enhanced to provide the system manager at a unit with greater control over user access. The manager should be able to control the particular functions that a user can use and the domain in the database where those functions can be applied. For example, a user could be granted full access to records of a certain subunit but "read-only" access to the rest of the EIR. For equipment transfers, the manager should also be able to limit a user to posting equipment transfers within a selected group of OPFACs and subunits, such as the units in a Group. Restrictions should also be available to allow editing of records on test or nontest equipment only.

The transaction history log should automatically record the identity of the user and the date and time of each transaction. The long-term archive of this log should be maintained at the central site. An EEIS manager should be able to obtain a complete transaction history on any electronic item recorded in EEIS.

If EEIS is enhanced to prepare and submit various equipment-oriented documents, the system manager should be able to control the authority to release documents electronically. Other personnel may be given the ability to prepare documents but not release them.

The organizational reference file in EEIS should identify the users that maintain the EIRs for specific OPFACs. That information would allow the central site to verify whether reporting on behalf of another unit is properly authorized.

Training and Support

To achieve the full potential of an enhanced EEIS, the Coast Guard must provide an effective training and support program. The program should cover the needs of established users as well as personnel that are involved with EEIS for the first time.

Role of the Electronics Engineering Center

As the central design activity for EEIS, EECEN should have the lead responsibility for providing training. This responsibility should include developing a syllabus and training material for formal classroom training, a computer-based tutorial, and built-in context-sensitive "help" screens within EEIS. EECEN should also provide training to personnel from the EMDs and ESUs, enabling them to train and assist EEIS users under their purview.

If the tutorial and built in "help" support is thorough and well designed, little classroom training should be required. Therefore, both the tutorial and help

support should be viewed as "high-leverage" investments worthy of continued attention and refinement.

EECEN has produced an instructional video tape of EEIS. Because that medium does not allow viewers to interact with the system, it is inherently less effective than a well-designed computer-based tutorial. Users need to perform hands-on exercises to develop competence with software. The video tape format, however, could be highly effective for another element of training: educating users and managers on the importance of maintaining accurate EIRs. A well-made video tape could explain the applications of the EIR in the logistics support system for Coast Guard electronics, as well as the legal requirements of property accounting. Such a tape would be appropriate viewing for electronic maintenance personnel, prospective commanding officers, and officers-in-charge.

Roles of Electronic Maintenance Detachments and Electronic Support Units

The EMDs and ESUs are well positioned to provide direct training and assistance to operational units, including units reporting to the Area Commanders. They should periodically provide that training, along with assistance on an ad hoc basis. During their technical assessment visits, they should identify and resolve user difficulties with EEIS.

EMDs and ESUs should also work with EECEN to ensure that at least one staff member is fully qualified to support their customers' needs for training and assistance. In addition, EMDs and ESUs should serve as the Coast Guard's "eyes and ears" for users' needs and difficulties with EEIS. While users should be encouraged to submit suggestions or report problems to EECEN, a proactive role by the EMDs and ESUs could greatly improve the exchange of information. Both Headquarters and EECEN should be apprised of systemic EEIS problems.

CHAPTER 6

Logistics Issues and Business Rules

In this chapter, we discuss a variety of issues related to the efficiency of the logistics support provided to the electronics community. While these issues are not directly related to the functionality of EEIS, field personnel considered them serious enough to cite as major problems that need to be resolved.

LOCAL PROCUREMENT OF EQUIPMENT

The *Coast Guard Electronics Manual* requires all standardized electronic equipment to be purchased centrally to ensure efficient and economic support to end users. Currently, too many Coast Guard organizations are buying electronic equipment. Local purchases of electronic equipment include the electronic configurations of small boats, Global Positioning System (GPS) receivers, portable radios, cellular phones, and antennas. From the standpoint of supply support, maintenance, configuration control, and operator training, local purchases of that equipment introduces a number of unnecessary complications.

When a unit identifies a requirement for new hardware, the required *functionality* of that hardware should be communicated to the supporting MLC and Headquarters. The MLC and Headquarters should then develop the best approach for satisfying the requirement.

ASSIGNMENT OF STANDARD NOMENCLATURE

When a unit receives electronic equipment, the item is recorded in the EIR. Part of the equipment record is the nomenclature field. If the nomenclature is not known, the user enters "none" in the field and requests Headquarters to develop a standard nomenclature. Local procurement of electronic equipment has inevitably resulted in users recording equipment in EEIS with the nomenclature of "none." Additionally, EEIS users have been provided with *centrally* procured electronic equipment that was fielded without standard nomenclatures. Examples found during our research included components of the Vessel Tracking System 2000, Digital GPS, and Ship's Command and Control System.

Fielding equipment without nomenclatures forces many units to submit nomenclature requests for identical items to Headquarters. These actions distort the review and approval process and may result in the same item being assigned more than one nomenclature.

Acquisition managers should work with the Headquarters EEIS manager to ensure that *all* electronic equipment are *first* assigned a nomenclature before they are fielded. The oversight process for acquisition managers should enforce this requirement.

ALLOWANCES FOR SPARE EQUIPMENT

> COMDTINST 4100.7, *Engineering Logistics Concept of Operations,* states that "The purchase and inventory management of selected items, including the placement and quantity of inventory at all levels, will be centrally planned, based on responsiveness and cost considerations."

Nearly all EEIS users hold spare equipment. The selection of that equipment and the quantities are decided *locally.* Such decisions are at variance with COMDTINST 4100.7 and in sharp contrast to the practice of centrally computing the allowances for spare parts. From the local perspective, the holding of spares makes the job of supporting operational units easier. In contrast, from the Coast Guard's perspective, this practice can be very costly. We believe the most appropriate method for optimizing the Coast Guard's investment in electronic equipment is to compute allowances for spare equipment based on the type and density of *installed* equipment to be maintained, equipment costs, supporting maintenance capability, and operational readiness requirements.

ELECTRONIC REPAIR PARTS ALLOWANCE LIST PROCESS

SCB computes an ERPAL by using the population of installed electronic equipment reported on the EIR and the allowances reflected in the APLs. According to many EEIS users, however, the ERPALs provide allowances for many repair parts that units do not need and exclude or unduly constrain allowances for repair parts that are needed. APLs often show allowances based primarily on engineering estimates, not actual user requirements.

Users also expressed concern over the frequency of ERPAL updates. For example, the ESU Alameda ERPAL had not been updated in four years. A review of the ERPAL process is in order to determine how the system can be made more responsive to user needs.

RETROGRADE PIPELINE

When a repairable electronic item (Code XB) fails and cannot be repaired locally, the unit orders a replacement item. Currently, an inoperable item is shipped to the source of supply (normally SCB) only *after* the ready for issue (RFI) item has been received. This practice allows users to reuse the shipping

container in which the RFI item arrived, but it also extends the retrograde pipeline.

To provide a specific level of materiel availability, the supply system must stock materiel to cover usage while inoperable items are being returned and repaired. Thus, holding inoperable items while awaiting the arrival of RFI items increases the Coast Guard's investment in equipment.

TEST EQUIPMENT CALIBRATION

Centralized Management

Each unit in the Atlantic area receives funds to calibrate electronic test equipment as part of its funding for equipment maintenance. Each unit is also responsible for identifying a source of calibration services and contracting for those services. Many ETs in the Atlantic area reported they are often unable to meet the required calibration requirements for their test equipment because of competing priorities for maintenance funds. In the Pacific area, ETs do not have that problem because MLC contracts with calibration laboratories to support its units; it also pays for those services.

Nearly all electronic maintenance personnel interviewed expressed a strong preference for MLC PAC's approach because it reduces the units' administrative workload. Also, if calibration services are centrally procured, the contracting officer has the potential to negotiate lower prices. MLC PAC estimates that it has reduced calibration costs by at least 30 percent by centrally contracting for its units.

Calibration Frequencies

Representatives from several units stated that the published standards for calibrating test equipment result in equipment being calibrated more often than they consider necessary. They mentioned improving trends in equipment reliability as a fundamental reason why calibration should not be performed as often as in the past. They also conjectured that calibration standards might be driven, in some cases, by aviation requirements. Many technicians suggested that the required level of precision when working on shipboard systems may be inherently lower than the level of precision required in aviation maintenance.

Some technicians suggested that a large calibration laboratory should be engaged to provide the Coast Guard with detailed data on the results of test equipment calibration. That information could then be used to establish appropriate calibration frequencies. Personnel from ESU Honolulu indicated a willingness to work with their supporting calibration laboratory to collect that type of data.

Planned Maintenance Support Requirements and Technician Availability

During our field work, electronics maintenance personnel often mentioned that the scope of their maintenance responsibilities and the limited manning levels prohibited them from performing all of their required PMS. If all required PMS cannot be performed, and the Coast Guard has no policy to determine which maintenance actions can be deferred, the actual PMS accomplished at different units will vary widely.

If technicians in the field are overwhelmed by PMS requirements, they need guidance on identifying the maintenance actions that could be deferred and those that need to be performed. EMOs and technicians also need to provide the MLC and Headquarters with timely and accurate feedback when they cannot satisfy their PMS requirements.

Promulgating EEIS Policy

EEIS users are currently required to comply with policy provided in both the *Property Management Manual* and the *Coast Guard Electronics Manual.* The ETS interviewed during our research were knowledgeable about the contents of the *Electronics Manual,* but most showed little familiarity with the *Property Manual.* Because ETs use the *Electronics Manual* for both electronics equipment management and property management, they believe that it should incorporate property accounting procedures.

Discipline in Property Accounting

With few exceptions, many of the units visited indicated that they routinely did not maintain their EIR on a timely basis because of higher priorities. Some unit managers also stated they have no incentive to maintain their EIRs. However, many of those same units also described difficulties in resolving record inaccuracies that had been neglected for months because personnel could not remember the circumstances surrounding a change in equipment.

Units that successfully used EEIS had managers that made maintaining an accurate EIR an organizational priority. Those managers insisted their personnel provide the EEIS managers with timely and accurate information on equipment changes and update their EIRs at least weekly. Those units demonstrated that, even with the deficiencies in EEIS, it is possible to keep EIRs accurate and up-to-date.

In Chapter 7, we provide our recommendation on how the Coast Guard can improve EEIS.

CHAPTER 7

Recommendations

The recommendations in this chapter are divided into two sections – those related to the EEIS requirements that we presented in Chapter 5 and those related to the business issues discussed in Chapter 6. Appendix A presents our recommendations for EEIS in tabular form.

ELECTRONIC EQUIPMENT INFORMATION SYSTEM

We have organized our recommendations for the EEIS system (or its successor) into three groups: short term, mid term, and long term. We further propose that these recommendations be assimilated into the plans for upgrading Coast Guard information systems. Specifically, they should be acted upon during the development of Accountable Inventory Management (AIM) and future changes in the CMplus system.

Short-Term Actions

The Coast Guard is in the process of incorporating EEIS into the new AIM system. The primary enhancement to EEIS in that conversion should be to consolidate all EIRs at a central site and to provide remote access to that site.

At the same time, the configuration management plus (CMplus) system, which includes current EEIS capabilities, is being implemented at afloat units. The central site should eventually incorporate the EIR data collected by both AIM and CMplus.

We recommend that the Coast Guard provide the following additional enhancements to AIM and CMplus in the short term:

- Establish a system for near real-time dissemination of changes to the master nomenclature file
- Provide for the recording of accurate calibration frequencies (from 0 to 99 months) for test equipment
- Sort calibration schedules in order of the next calibration due date

- Incorporate printer drivers for laser printers, including the capability for landscape-orientation printing and a selection of font sizes

- Provide the capability to access an equipment record by specifying either the serial number or model number

- Incorporate into EEIS a standard format for a nomenclature request and enable the system to forward such requests by E-mail

- Reformat the standard EIR listing by moving the Administrative Target Unit (ATU), OPFAC, and subunit to the page header, excluding the service OPFAC, and adding the "comments" field to the line-by-line format

- Allow users to specify a context of a unit or subunit and then edit several records without repeatedly respecifying the unit or subunit.

During the next few months, the Coast Guard should perform an intensive review of the master nomenclature file to eliminate duplicate nomenclatures for identical equipment and to standardize nomenclature formats. The user community should be tasked to submit nomenclature requests on "none" entries on their EIRs. The Headquarters EEIS manager should provide guidance for resubmitting requests based on the age of requests that were previously submitted but apparently lost.

Mid-Term Actions

Our recommendations for mid-term enhancements are capable of being implemented by early 1997. Before then, the Coast Guard should expand the functionality of EEIS, implement the use of bar codes to track electronic equipment, and take steps that will permit continuous life-cycle visibility of electronic equipment. It should also establish a stronger role for user training and support from the EECEN, EMDs, and ESUs.

Expanded Functionality

The mid-term phase of expanding EEIS functionality should focus on the following features:

- Produce PMS schedules and record PMS as it is completed. Along with the printed schedules, provide the information needed to verify configuration data and enable EEIS to process the results of that effort.

- Provide PMS requirements through the central site, and enable users to access that information when preparing PMS schedules.

- Enable EEIS to produce DD Form 1149, Reports of Survey, Reports of Excess Personal Property, and PMS Feedback Reports. Provide for the printing and electronic submission of these forms.

- Provide ERPALs and APLs through the central site.

Bar Codes

Bar coding the thousands of items of electronic equipment should be a mid-term objective of the Coast Guard. Many units are likely to need assistance to perform this task expeditiously. Prototype activities offer the best environment for determining the extent of the support needed to apply the bar codes and record them in the EIR.

The Coast Guard should also establish the policies and develop the methods to ensure bar codes are applied to new equipment. The objective of these policies should be to ensure that the bar codes are applied to new equipment by the organization that first receives it from the contractor or Federal Supply System. Moreover, if SCB or an SMEF receives a piece of equipment without a bar code from a Coast Guard activity, it should apply a bar code and update the central site with the bar code number.

Life-Cycle Visibility

As bar codes are implemented, the Coast Guard should establish continuous visibility of electronic equipment. That visibility means requiring all organizations that handle electronic equipment, including SCB, the SMEFs, and the MLCs, to report receipts and issues to the central site. The Coast Guard should develop detailed methods for carrying out that reporting.

Training Program

EECEN should develop an EEIS training program that includes training aids for use by EMDs and ESUs in directly supporting users. EECEN should begin train-the-trainer classes for EMD and ESU personnel selected to provide instruction to the units. EECEN should also begin developing a computer-based training module for self-paced learning.

Long-Term Actions

The long-term development of information systems for logistics support of electronic equipment should occur within the CMplus and Fleet Logistics System projects. The longer term actions include the challenging tasks of developing technical reference files and an automated technical research capability. The

Coast Guard should establish priorities for completing any requirements described in Chapter 5 that are not satisfied during the short- and mid-term planning periods. The requirements that are most readily satisfied include expanding the EEIS data structure, providing a modern graphical user interface, and providing more powerful query tools.

CHANGES IN BUSINESS PRACTICES

The recommendations detailed in the following subsections are aimed at resolving the business issues discussed in Chapter 6.

Equipment Standardization

We recommend that the Coast Guard review the electronics configuration of units, especially those with high populations of commercial electronic equipment such as that found on small boats. By reviewing the operational requirements of small boats under different conditions and missions, the Coast Guard should be able to develop standard sets of equipment and to bring the configuration of every small boat into line with one of those configurations.

Other areas in which excessive local procurement of equipment has resulted in a proliferation of equipment models should similarly be analyzed and Service-wide standards established. Local units should not be authorized to procure any equipment for which Service-wide standards exist. For standard models not already available in the Federal Supply System, SCB should make all procurements.

The Coast Guard should establish a system that enables units to communicate their requirements for nonstandard equipment to Headquarters. The unit should then receive a prompt response identifying the Coast Guard standard to satisfy the need.

Nomenclatures

The Coast Guard should establish and enforce a policy that requires acquisition managers to obtain a standard nomenclature for any equipment before fielding it. In rare cases where the local procurement of equipment is allowed, the equipment should not be installed without being assigned a standard nomenclature. The system of electronically submitting and rapidly processing nomenclature requests should be implemented before such a policy is enforced.

Allowances for Spare Equipment

We recommend that the Coast Guard develop an algorithm for computing allowances for spare equipment. That algorithm should recognize the operational readiness requirements of different equipment by type of unit. For inventory requirement calculations, a readiness requirement should be translated to a probability of equipment failure without having a serviceable spare on hand. The algorithm should incorporate the unit's maintenance capability, failure rates, equipment cost, and population of installed equipment. The objective of the calculation should be to establish a set of allowances that will meet a readiness requirement at minimum cost.

The central site should know when a unit is holding spare equipment in excess of allowances. Such equipment should be available for redistribution, with reimbursement to the owner, when new requirements emerge for those items.

Electronic Repair Parts Allowance List Process

The Coast Guard should undertake a thorough analysis of the ERPAL process to determine the extent to which ERPAL allowances meet customer usage requirements. That analysis should consider whether the APLs as they are now constructed are a reliable basis for user requirements or real-world demand data must be systematically collected and used for ERPAL calculations.

Updating ERPALs should become a much more dynamic process, reflecting changes in a unit's EIR and the most current data on spare part requirements for different equipment. Changes to an ERPAL should be disseminated through the central site on a near real-time basis.

Retrograde Pipeline

We recommend that the Coast Guard reevaluate its practice of holding an inoperable item until its replacement is received and quantify the incremental investment in equipment stemming from current practices. If an immediate return of inoperable items is desirable, the Coast Guard should develop procedures for packing the inoperable items for shipment before the unit has access to the new item's shipping container.

The electronics community may be unwilling to accept a comprehensive requirement to return retrograde equipment immediately because of its desire to reuse shipping containers. If so, the Coast Guard should develop a system that notifies units when the depot-level repair process for *specific* items is constrained by a shortage of unserviceable carcasses. In those situations, the units should ship the inoperable items as soon as possible using express transportation services.

Test Equipment Calibration

MLC LANT should investigate the feasibility and advantages of funding and procuring calibration services centrally, similar to MLC PAC's practices. We recommend analyzing the cost of having test equipment calibrated with and without central procurement. Headquarters should consider extending the MLC PAC approach to one Coast Guard-wide program. The size of the potential contract could invoke considerable interest among competing companies that provide calibration services.

While investigating possible changes in this area, the Coast Guard should investigate the assertions made by ETs in the Atlantic Area that they often cannot have their equipment calibrated because of competing priorities for funds. Further, they expressed a concern that some electronics equipment was being calibrated more often than necessary. The extent and consequences of these problems should be determined.

Planned Maintenance System Requirements

It is crucial for the Coast Guard to determine whether some units are unable to perform their PMS and the related impact on their operational capabilities and maintenance costs. The reasons for a discrepancy between goals and capabilities should be investigated, and appropriate changes made to staffing levels, collateral duty assignments, PMS schedules, and guidance for deferring maintenance. Moreover, the methodologies for computing staffing levels should be reexamined to determine if systemic problems contribute to such discrepancies.

Electronic Equipment Information System Policy

The Electronics Manual should set more stringent standards than are currently in force for the recording of equipment changes in EEIS. The *Electronics Manual* requires that equipment changes be recorded within 30 days. We recommend that the EIR be brought up-to-date no less than weekly. The *Electronics Manual* also specifies a maximum period between equipment inventories of 3 years. We recommend that time be reduced to 1 year.

Although our research indicates that ETs desire an *Electronics Manual* that incorporates property management procedures, such procedures for electronics equipment will require considerable coordination so it will not duplicate existing procedures. In order to maintain the concept of a single property management document, we recommend that electronics property procedures be published as part of the Unit AIM documentation and not in the *Electronics Manual.*

Oversight

More training and education on the supply and maintenance uses of EIR data can increase the users' motivation to maintain current EIRs. In addition, we recommend more oversight of the EIR reporting process to instill discipline in the system, including thorough on-site inspections to check equipment and records.

During a change of command or change of custodian, departing personnel should be held accountable for missing equipment in accordance with the *Property Management Manual*. EMDs and ESUs are well positioned to provide that oversight.

APPENDIX A

EEIS Requirements Tables

Tables A-1, A-2, and A-3 list the near-term, mid-term, and long-term requirements, respectively, that we presented in Chapter 5. Each table identifies the requirements and lists the page in Chapter 5 where they are discussed.

Table A-1.
Near-Term Requirements for EEIS

Requirement	Page no.
Connect all EEIS systems to a central site to provide a consolidated Coast Guard-wide EIR	5-1
Provide remote access to EEIS central site	5-1
Provide near-real-time updates to the master nomenclature file	5-2
Provide software drivers for laser printers	5-9
Allow records to be accessed by equipment serial number	5-10
Allow records to be accessed by model number	5-10
Reformat the EIR listing to include the "comments" field	5-10
Allow edits to several records in a unit/subunit by specifying that context only once	5-11
Enable EEIS to accurately record calibration frequencies	5-15
Sort calibration schedules in order of next calibration due date	5-15
Provide standard format for nomenclature requests in EEIS	5-20
Enable user to submit a nomenclature request by E-mail from within EEIS	5-20

Note: EEIS = Electronic Equipment Information System; EIR = electronic inventory record.

Table A-2.
Mid-Term Requirements for EEIS

Requirement	Page no.
Disseminate ERPALs through central site	5-2
Disseminate APLs through central site	5-8
Provide PMS requirements electronically from EEIS central site	5-8
Implement bar codes to identify electronic equipment	5-13
Achieve continuous life-cycle visibility of electronic equipment	5-13
Produce PMS schedules; include equipment serial numbers on schedules	5-19
Enable EEIS to produce the following documents:	5-20
DD Form 1149	
Report of Survey (CG Form 5269)	
Report of Excess Personal Property (SF 120)	
PMS Feedback Reports (CG-5451)	
Institute a training program for EEIS users	5-22

Note: APLs = Allowance Parts Lists; ERPALs = electronic repair parts allowance lists; PMS = Planned Maintenance System.

Table A-3.
Long-Term Requirements for EEIS

Requirement	Page no.
Maintain in central site a long-term history of equipment ownership	5-1
Maintain in central site a long-term history of equipment alterations	5-1
Provide for in-transit tracking of equipment during transfers	5-1
Maintain in central site a long-term archive of all transactions that change EIRs	5-2
Expand structure of the master nomenclature file	5-2
Expand structure of the locally maintained EIR data files	5-4
Provide reference files through the central site to all users:	
Organization File	5-5
Manufacturer's Reference File	5-7
System Configuration File	5-7
Equipment Alteration File	5-7
Technical Manuals	5-8
HSC-Description File	5-8
PEETE Index	5-9
SPETERL File	5-9
Record access through picklists and plain language manufacturer's names	5-10
Modern query capability	5-10
Custom report formats	5-11
"Undo" key	5-11
User-defined picklists for primary locations	5-11
Single screen to record data on old and new equipment after replacement	5-11
Maintain unit or subunit context when making multiple edits to a unit or subunit	5-11
Validate format of equipment serial number	5-12
Headquarters utility to process nomenclature requests	5-12
"Reason for transfer" codes to use when posting an equipment transfer	5-14
Picklists for posting an intra-Group equipment transfer	5-14
System and entire subunit transfers	5-14
Track equipment loans	5-14
Track "due-in" equipment moves	5-14

Note: DRMO = Defense Reutilization and Marketing Office; EMD = Electronic Maintenance Detachment; ESU = Electronic Support Unit; HSC = hierarchical structure code; NAVSUP = Naval Supply Systems Command; OPFAC = operating facility account code; PEETE = portable electrical/electronic test equipment; SCLSIS = Ship Configuration and Logistics Support Information System; SPETERL = ship's portable electrical/electronic test equipment requirements list..

Table A-3.
Long-Term Requirements for EEIS (Continued)

Description	Page no.
Produce reports on EIR changes within specified time periods	5-14
Produce EIR reports on multiple units	5-14
Provide for a default service OPFAC	5-15
Validate service OPFAC entries	5-15
Project costs for test equipment validation	5-16
Track test equipment held by calibration laboratory	5-16
Track out-of-service test equipment	5-16
Produce reports on application of test equipment	5-16
Record parent-child relationships between equipment	5-17
Optionally group equipment by system on equipment reports	5-17
Automatically update SCLSIS from the central site	5-17
Associate components that are normally installed or removed as a set	5-17
Validate recorded system configurations	5-17
Record equipment alterations	5-18
Prevent erroneous record deletions regarding parent-child relationships	5-18
Automatically generate OPNAV 4790/CK documents	5-18
Support user validation of EIR data when recording PMS	5-19
Provide efficient means to report equipment failures	5-19
Expand EEIS capability to automatically produce the following documents:	5-20
DD Form 1348 (turn-in to DRMO) NAVSUP 1250 System Trouble Report System Improvement Request Software Trouble Report Mailing labels	
Automate repair part technical research	5-21
Tailored user access by subunit or test/nontest equipment	5-22
Maintain complete transaction log with user identification	5-22
Tailor user authority to prepare and/or release documents electronically	5-22
Validate unit's authority to report for another unit	5-22
Develop complete computer-based tutorial	5-22
Develop complete context-sensitive help functions	5-22
Establish strong EMD/ESU oversight and training role	5-23

Note: DRMO = Defense Reutilization and Marketing Office; EMD = Electronic Maintenance Detachment; ESU = Electronic Support Unit; HSC = hierarchical structure code; NAVSUP = Naval Supply Systems Command; OPFAC = operating facility account code; PEETE = portable electrical/electronic test equipment; SCLSIS = Ship Configuration and Logistics Support Information System; SPETERL = ship's portable electrical/electronic test equipment requirements list..

APPENDIX B

Case Study: Success with the Electronic Equipment Information System

Many Electronic Equipment Information System (EEIS) managers believe that the demands placed on electronic maintenance personnel, and the limitations of the EEIS system, make it almost impossible to keep their electronic inventory record (EIR) accurate. The experience of U.S. Coast Guard Group, Miami suggests that while the task is difficult, it can be done. The size of the Group Miami operation and its high tempo of activity make it as challenging an environment for an EEIS manager as can be found in the Coast Guard. The Group's afloat responsibilities include six 110' cutters, three 82' patrol boats, and ten 41' utility boats. Additionally, it supports four stations, five high sites, the high-frequency (HF) equipment at Air Station Miami, and a radio beacon.

During the past 18 months, Group Miami has gained control over a seemingly intractable job of keeping its EIR up-to-date. The Coast Guard can benefit from a review of the magnitude of the problem the Group overcame and the keys to its success.

PROBLEM

When Chief Warrant Officer Kevin Miller reported for duty as the electronics maintenance officer (EMO) of Group Miami in June 1994, the Group's most recent feedback report from Maintenance and Logistics Command, Atlantic (MLC LANT) indicated that about 2,000 items were "unaccounted for." The records had obviously been badly neglected, and no quick solution to the problem was apparent.

Mr. Miller contacted the EEIS Manager at MLC LANT, CWO Richard Thompson, to request assistance. During August, Mr. Thompson spent a week in Miami to assess the problem. He returned a month later with a team of three technicians and worked for two weeks with the Miami personnel to perform a 100 percent baseline inventory. At the conclusion of that effort, they discovered that 1,307 items on the Miami EIR were missing. The missing items had apparently been replaced during corrective maintenance, but the changes had not been recorded.

The MLC LANT team returned to New York in September and began building a new set of data files for Group Miami. In February 1995, Mr. Thompson

returned to Miami and reinitialized the Miami EEIS system with the data collected during the September inventory. However, during the intervening months, Miami had been without an EEIS system, and the equipment changes during that period were not included in the new files. From March to May 1995, as time permitted, the Miami personnel performed another inventory and brought the EIR up-to-date.

SOLUTION

Since its EIR was "purified," Group Miami has demonstrated an effective and highly efficient approach to property accounting for electronic equipment. The result has been an EIR as accurate as that of any major activity in the Atlantic Area. The key elements of that effort are outlined in the following subsections.

Electronics Maintenance Officer Involvement

Mr. Miller recognized from the beginning that he had to be regularly involved in EEIS, so he took the unusual step of appointing himself as EEIS manager. While MLC prepared the new files, he developed a program that spread the responsibilities for EEIS among custodians, technicians, and EMOs. After the time-consuming steps of training all parties in their respective roles and instilling discipline into the system, he has been able to keep the Group's EIR current by personally investing about one hour a week.

Custodian Responsibility

As in all Coast Guard Groups, the equipment for which the EEIS manager is responsible is distributed across a number of units. Many of those units had become accustomed to thinking of the accuracy of their EIRs as the responsibility of the electronics maintenance personnel. Group Miami had to effect a fundamental change in attitude among those custodians by impressing upon them that they were responsible for equipment in their custody. In effect, they were made active partners in tracking equipment changes. This partnership was particularly important when a boat was operating out of the area and technicians at another facility worked on its gear.

Technician Responsibility

Mr. Miller trained his technicians to become diligent reporters of all changes in equipment in which they were involved. He instituted a simple method of capturing this information that proved highly effective. All ready for issue (RFI) spares were tagged with a "Serviceable Tag - Materiel" (DD Form 1574). The fronts of those tags, including nomenclature and serial numbers, were completed before RFI items were placed on the shelf. He also created a special stamp for the back of those tags, where data on the unserviceable items were recorded when they were replaced. The technicians also recorded on the back of the tags the names and signatures of unit custodians. Figure A-1 illustrates the format of these tags. The technicians place the completed tags in a designated collection basket in their shop, and Mr. Miller collects them weekly and updates the EEIS system. Occasionally, the serial number recorded on a tag for an unserviceable item does not match the data in EEIS. At that point, the technician becomes responsible for investigating the mismatch. That procedure has greatly increased the technician's motivation to capture the data accurately the first time.

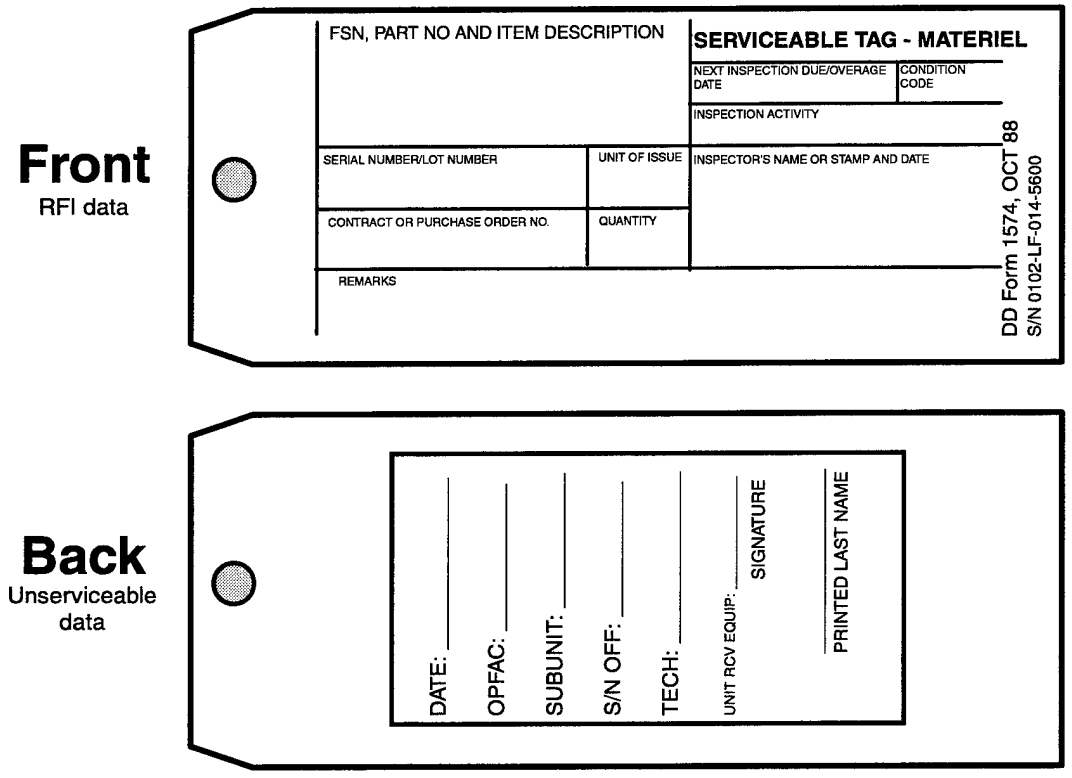

Figure A-1.
RFI Tag with Stamp for "Not Ready for Issue" Data

System Refinements

In addition to the use of the RFI tags, Group Miami has enhanced EEIS in a number of ways. Many of those enhancements were made possible because Mr. Miller, with the assistance of Mr. Thompson, learned to write ad hoc queries in EEIS. That feature allowed Group Miami to tailor the format and order of its reports, making them much more user friendly.

The refinements at Group Miami include the following steps:

- Standard location names were established for installed equipment on cutters and boats, and each equipment record specified one of those locations. This procedure enabled Group Miami to generate equipment lists in location order, making inventories much easier.

- Calibration lists were sorted first by location electronics technician shop, telecommunications technician shop, and projects shop, and within location by calibration due date. This process made it easier to gather test equipment for the periodic trips to the calibration laboratory.

- A custom "purge report," which included the comments field, was provided for items transferred.

- The list of items recorded with the nomenclature "none" was sorted by operating facility account code and subunit and included the comments field. This sorting made inventorying the "none" items much easier than with the standard EEIS listing, which does not include comments.

Benefits of an Accurate EIR

Since its EIR has been kept current, Group Miami now considers it a useful management tool. It is now used to check the library of technical publications to ensure that the Group has a complete set. An accurate record of test equipment and calibration dates has helped Group Miami avoid the expense of unnecessary equipment calibration. Its inventory lists, sorted in location order, provide check lists to ensure that its Planned Maintenance System (PMS) program is complete. Those inventory lists are also useful in familiarizing new technicians with the equipment. Finally, with its EIR in order, the Group knows when a cutter or boat has more items recorded than it should, i.e., superfluous equipment is much more visible.

LESSONS LEARNED

The following valuable lessons can be learned from Group Miami's experience with EEIS:

- Leadership is crucial in getting the custodians and technicians to assume responsibility for property accounting. No individual can maintain an EIR; it must be a *team* effort, with all players consistently doing their part.

- Weekly maintenance of the EIR is essential. Trying to correct record inaccuracies that have been ignored for weeks or months is vastly more difficult than attending to the issues as they arise.

- Using equipment tags to capture the data on equipment changes is a simple, highly effective way to collect crucial information.

- The report formats in EEIS need to be refined to provide the information in a more convenient format and order for users. Learning how to write ad hoc queries is worth the effort.

- The practice of recording equipment using *standard* location names makes reports that are sorted in location order far more useful to users.

- An accurate EIR can help an electronics shop do its job better.

APPENDIX C

Glossary

ADS	=	Application Development System
AIM	=	Accountable Item Management
APL	=	Allowance Parts List
CAGE	=	Commercial and Government Entity
CASREP	=	Casualty Report
CMplus	=	configuration management plus
COMDTINST	=	Commandant Instruction (Coast Guard)
CWOS	=	Chief Warrant Officer
DoD	=	Department of Defense
DRMO	=	Defense Reutilization and Marketing Office
E-mail	=	electronic mail
EDI	=	electronic data interchange
EECEN	=	Electronics Engineering Center
EEIS	=	Electronic Equipment Information System
EICAM	=	Electronic Installation Change and Maintenance
EIR	=	electronic installation record
EMD	=	Electronic Maintenance Detachment
EMO	=	electronics maintenance officer
ERPAL	=	electronic repair parts allowance list
ESU	=	Electronic Support Unit
ESWBS	=	expanded ships work breakdown structure

ET	=	Electronics Technician
FEDLOG	=	Federal Logistics
G-CFM	=	Financial Management Division
G-ELM	=	Logistics Management Division
GPS	=	Global Positioning System
G-T	=	Office of Command, Control and Communication
G-TES	=	Electronic Systems Division
HF	=	high frequency
HSC	=	hierarchical structure code
IMP	=	index of maintenance procedures
JETDS	=	Joint Electronics Type Designation System
MDS	=	manufacturer's designating symbol
MLC	=	Maintenance and Logistics Command
MPC	=	maintenance procedure cards
MRC	=	maintenance requirements cards
NAVSUP	=	Naval Supply Systems Command
NSN	=	National Stock Number
OPFAC	=	operating facility account code
PEETE	=	portable electrical/electronic test equipment
PMS	=	Planned Maintenance System
RFI	=	ready for issue
SCAT	=	special category
SCB	=	Supply Center Baltimore
SCLSIS	=	Ship Configuration and Logistics Support Information System

SMEF	=	Ship's Maintenance Electronics Facility
SSMR	=	shore station maintenance request
SPETERL ments list	=	ship's portable electrical/electronic test equipment require-
SQL	=	Structured Query Language

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EEIS was designed to meet the requirements of property accounting for electronic equipment and to schedule the calibration of electronic test equipment. The EEIS user community, however, needs an information system that offers more than those features. To maximize the time that technicians have for equipment maintenance, the system must provide more complete support for their administrative requirements. Moreover, the efficiency of the Headquarters, MLCs, and SCB would be strengthened if EEIS could satisfy more of their information requirements.

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